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AGRICULTURE.

Reports and Prospects.

Kokstad, *Dec. 3rd.*—The agricultural outlook as regards grain is still bad. With the exception of a few thunderstorms, which have done only a very small amount of good, the drought still continues. Stock of all kinds are doing fairly well, and the majority of locusts appear to have left the district, possibly to seek some spot where there appears a better chance of procuring food.

W. LEARY, A.R.M.

Maclear, *Dec. 15th.*—Some fine rains fell during the month and both pasture and stock are at present in good condition. Unfortunately, large swarms of locusts have made their appearance in some parts of the district and are doing considerable damage to standing crops. H. BUNN, R.M.

Matatiele, *Dec. 1st.*—Hardly any rain has fallen during the past month and then only in parts of the district; the consequence is that springs are failing and pasturage is becoming completely dried up by the scorching hot winds. If we do not have rain before the end of the month I fear the prospects of the coming year are very black. Few have been able to plough in consequence of the drought. An immense swarm of locusts have made their way into the district from the Mt. Fletcher side, but the wind blew them into the Native Locations, where the Natives are collecting them in bags for food. No cases of lung-sickness have been reported during the month.
R. CUMMING, A.R.M.

Mount Ayliff, *Nov. 30th.*—Rain is greatly needed. Even where people have been able to plough and sow, the seeds have in many instances failed to germinate owing to excessive dryness. The pasturage in some places is fairly good, but in other spots it is very poor. Stock are in fair condition. There is no contagious disease among any animals. Locusts have not done much harm, though several swarms have passed through the district. R. HARRIES, R.M.

Mount Fletcher, *Nov. 30th.*—Rain has fallen this month but still the country is very dry. A little ploughing has been done. A large swarm of locusts is in the district. Cattle, horses, etc., are not looking as well as they should for this time of year, which may be accounted for by pasturage being bad. H. P. TILLARD, A.R.M.

Mount Frere, *Dec. 5th.*—During the past month a couple of showers fell, freshening up the veld for a day or two, and some ploughing has been done in soft land, but the rain was insufficient to do much good. Long warm days and prevailing winds have parched up the grass, and consequently the veld is again as dry as ever. Large swarms of locusts in voetgangers' stage made their appearance in some parts of the district and a successful experiment was made with sheep dip to destroy them; there are now very few left in the district. There is a large amount of small-pox amongst the Natives in Lutateni's and Kolobile's Locations, the source of which is unknown, and every effort is being made to prevent it from spreading. No fresh cases of lung-sickness have been reported, and considering the poor state of the veld, stock of all kinds are looking well. The agricultural outlook at present is gloomy, and it is anticipated that there will be a considerable shortfall in cereals in the ensuing season. The price of mealies has gone up from 25s. to 30s. per bag. H. GARNER, A.R.M.

Qumbu, *Nov. 30th.*—The drought still continues and the outlook for the next season is very gloomy. No ploughing to any extent has so far been possible, and the few lands cultivated in former months will have to be resown as the young crops were either dried up or destroyed by locusts. There will be no wheat or oathay crops. All stock are healthy and pasturage is fair. A. Rein, R.M.

Tsolo, *Nov. 30th.*—No rain has fallen since my last report, and the country, except in specially favoured spots on the mountains, is in a deplorable state through the continued drought, and as a consequence the majority of the people have been unable to plough. The "voetgangers" have now become winged locusts, and occasional swarms of the latter are still met with. No reports of successful operations with the fungus have reached me. High winds have prevailed during the month, which have scorched up the veld in the low-lying parts and small stock are suffering from want of grass. Cattle have been sent to the mountains. The outlook is not a cheerful one. J. S. Simpson, R.M.

Umzimkulu, *Nov. 30th.*—Owing to want of rain the work of ploughing is being much retarded. Small showers have fallen during the month but not nearly sufficient for agricultural purposes, and difficulty is experienced in the upper portion of the district. A heavy hailstorm passed over this village and vicinity last week; the hailstones were of unusual size, many two inches in diameter, and did considerable destruction to gardens and orchards. Stock are free from disease; one case of lungsickness was reported last month, but as no further outbreak occurred, the farm has been released from quarantine. E. J. Whindus, R.M.

Pumpkins.

Prof. John A. Craig of the Iowa Experiment Station, in an article written for the *Breeders' Gazette*, says the more he considers the matter the more he is convinced that the pumpkin crop is one of exceptional value to the stock grower. The pumpkin compares favourably in feeding value with any root crop. Its value is further enhanced by the fact that pumpkin seed are a vermifuge, and the feeding of pumpkins is one of the best methods which can be used for preventing damage by worms. Cattle, sheep and hogs all relish pumpkins.—*Oregon Agriculturist.*

Harvest Prospects.

Reports furnished to the Agricultural Department by Civil Commissioners of the Principal Grain-Growing Districts, regarding the Grain Harvest for the present season:—

Division.	Wheat.	Barley.	Oats.	Other Grain.
Albert	Good.	Good.	Medium Drought & Locusts	Good.
Alexandria	Medium.	,,	Medium.	Medium.
Aliwal North	Good	,,	Good.	Good.
Barkly East	Medium (Drought & Locusts)	Complete failure. Drought and Locusts.	Very Inferior. Drought & Locusts.	Mealies. Complete failure. Drought and Locusts.
Bredasdorp	Excellent.	Excellent.	Failure. Rust.	Good.
Caledon	Good.	Good.	Almost entirely destroyed by Rust.	,,
Calvinia	Medium.	,,	Excellent.	Medium.
Cape	Good at present.	Good. Excellent in parts.	Complete failure through Rust.	Medium. Some Rust in Rye.
Cathcart	Inferior. In some parts a total failure from Drought, Locusts, Frost	Medium. Complete failure in Wards 2 and 5.	Inferior, through Frost & Drought.	Failure, through Frosts, Locusts and Drought.
Ceres	Inferior. Rust and Late Frost.	Medium.	Good.	Good (Rye and Mealies).
Clanwilliam	Good.	Good.	Medium	Good.
Colesberg	Owing to War little	was sown, but it is in	good condition.	None Sown.
Cradock	Com	plete failures owing to	Drought Locusts and	Rust.
George	Good.	Good.	Inferior. Rust.	Good.
Glen Grey	Inferior. Drought & Locusts	Inferior. Drought & Locusts	Medium. Drought & Locusts	Medium Drought & Locusts.
Graaff-Reinet	Medium. Drought.	Medium. Drought.	Good.	Medium. Drought.
Herschel	Medium.	Inferior.	Inferior.	Inferior. Drought & Locusts.
Humansdorp	Inferior. Rust & Drought.	Medium.	Inferior. Rust & Drought.	Mealies fairly good.
King William's Town ..	Too early to estimate,	but with Drought and	Locusts, harvest may possi-	bly be a complete failure.
Knysna	Good at present.	Medium.	Inferior. Rust.	None grown.
Ladismith	Inferior. Rust & Frost.	Inferior. Rust & Frost.	Inferior. Rust & Frost.	Inferior. Rust and Frost.
Malmesbury	Medium. Rust.	Excellent.	Almost complete failure through Rust.	Medium.

HARVEST PROSPECTS.—*Continued.*

Division.	Wheat.	Barley.	Oats.	Other Grain
Middelburg	Medium. Drought.	Medium. Drought.	Medium. Drought.	Medium. Drought.
Mossel Bay	Good, but too early to judge.	Good.	Imported good. Colonial bad.	Rye good, but not much sown.
Namaqualand	Good.	”	Medium. Rust.	Rye medium. Rust.
Oudtshoorn	Inferior. Rust.	Good, but not much sown.	” ”	Mealies, too early to judge.
Paarl	Medium. Rust.	Good.	Imported good. Colonial complete failure.	Medium.
Piquetberg	Good. Some Rust.	Good. Birds troublesome	Complete failure through rust.	Rye good. Some Rust
Queen's Town	Inferior. Drought.	Medium.	Inferior. Drought.	Inferior. Drought.
Riversdale	Complete failure through Rust except some Rietti and Medeah	Excellent.	Destroyed by rust, except from Egyptian and Algerian seed.	Rye. Good.
Robertson	Good, but Rust bad in early Wheat.	Good.	Inferior. Rust very bad.	” ”
Stellenbosch	Excellent as yet.	Very Good.	Complete failure through Rust.	Excellent as yet.
Steynsburg	Good.	Medium.	Excellent.	Medium.
Sutherland .. .	”	Good.	Good.	Good.
Swellendam	”	Excellent.	Complete failure through Rust.	”
Tarka	Complete failure	in all respects owing to	Prolonged Droughts, Locusts	and late Frosts.
Tulbagh	Medium. Rust.	Good.	Complete failure through Rust.	Medium. Rust.
Uniondale	Medium.	”	Good.	Good.
Van Rhynsdorp ..	Good.	Excellent.	Inferior. In some parts total failure through Rust.	Medium. Rye a total failure in some parts through Rust.
Wodehouse	Inferior.	Inferior.	Inferior.	Inferior.
Worcester	Good.	Good.	Inferior. Rust.	Good.

SUMMARY.

WHEAT.

Albert, Aliwal North, Bredasdorp, Caledon, Cape, Clanwilliam, Colesberg, George, Knysna, Mossel Bay, Namaqualand, Piquetberg, Robertson, Stellenbosch, Steynsburg, Sutherland, Swellendam, Van Rhynsdorp, Worcester,

Reported "Good" so far.

Alexandria, Barkly East, Calvinia, Graaff-Reinet, Herschel, Malmesbury, Middelburg, Paarl, Tulbagh,

Reported "Medium."

Cathcart, Ceres, Glen Grey, Humansdorp, King William's Town, Ladismith, Oudtshoorn, Queenstown, Wodehouse,

Reported "Inferior," owing to Drought, Locusts and Rust.

Cradock, Riversdale, Tarka,

Reported "Complete Failure," owing to Drought, Locusts and Rust.

BARLEY.

Albert, Alexandria, Aliwal North, Bredasdorp, Caledon, Calvinia, Cape, Clanwilliam, Colesberg, George, Malmesbury, Mossel Bay, Namaqualand, Oudtshoorn, Paarl, Piquetberg, Riversdale, Robertson, Stellenbosch, Sutherland, Swellendam, Tulbagh, Uniondale, Van Rhynsdorp, Worcester,

Reported "Good."

Cathcart, Ceres, Graaff-Reinet, Humansdorp, Knysna, Middelburg, Queenstown, Steynsburg,

Reported "Medium."

Glen Grey, Herschel, King William's Town, Ladismith, Wodehouse,

Reported "Inferior," owing to Drought, Locusts and Rust.

Barkly East, Cradock, Tarka,

Reported "Complete Failure" through Drought, Locusts, Frost and Rust.

OATS.

Aliwal North, Calvinia, Ceres, Colesberg, Graaff-Reinet, Mossel Bay (imported oats), Paarl (imported oats), Steynsburg, Sutherland, Uniondale,

Reported "Good."

Albert, Alexandria, Clanwilliam, Glen Grey, Middelburg, Namaqualand, Oudtshoorn,

Reported "Medium," owing to Drought and Rust.

Barkly East, Cathcart, George, Herschel, Humansdorp, King William's Town, Knysna, Ladismith, Mossel Bay (Colonial oats), Queenstown, Robertson, Van Rhynsdorp, Wodehouse, Worcester,

Reported "Inferior," owing to Drought, Rust and Locusts.

Bredasdorp, Caledon, Cape, Cradock, Malmesbury, Paarl (Colonial oats), Piquetberg, Riversdale, Stellenbosch, Swellendam, Tarka, Tulbagh,

Reported "Complete Failure" through Rust, and in one case through Drought and Locusts.

OTHER GRAIN.

Albert, Aliwal North, Bredasdorp, Caledon, Ceres, Clanwilliam, George, Mossel Bay, Piquetberg, Riversdale, Robertson, Stellenbosch, Sutherland, Swellendam, Uniondale, Worcester,

Reported "Good."

Alexandria, Calvinia, Cape, Glen Grey, Graaff-Reinet, Humansdorp, Malmesbury, Middelburg, Namaqualand, Paarl, Steynsburg, Tulbagh, Van Rhynsdorp,
Reported "Medium."

Herschel, King William's Town, Ladismith, Queenstown, Wodehouse,
Reported "Inferior" through Rust and Drought.

Barkly East, Cathcart, Cradock, Tarka,
Reported "Complete Failure" through Drought, Locusts and Frost.

American Silage Making.

Making ensilage is very generally adopted in the United States and has become one of the operations of stock farming. Continued and severe drought during the last four or five years has prevented any surplus growth of natural feed or the cultivation of forage plants for silage making in this country. Under the circumstances, there has been little said or thought about ensilage. Now, with a bountiful rainfall, and a possible hope that more prosperous seasons are in store for us, it will be well if some attention is given to this mode of providing in any degree against the times of starvation and loss we have had to pass through.

The Agricultural Experiment Station of the University of Wisconsin has published a bulletin containing a review of silage and silos from which we have taken the following interesting extracts:—

"The problems of silage and silo construction have been studied now continuously for nearly ten years. Two bulletins on the subject have been issued, and the present one embodies the knowledge which has been gained through a personal inspection of more than 200 silos, one-half of which were visited during the past year, together with the conclusions regarding the essential conditions necessary to the making and preserving of good silage which have been reached through experimental studies extending over seven years.

There yet remains much to be learned regarding the subject of silage, but we have now obtained a sufficient body of sound knowledge upon which to build a safe and economic practice in its handling.

SILAGE AS A FEED.

The verdict is practically unanimous among all dairymen, who have fed good silage, that it is the best winter feed they ever used as a substitute for hay or corn fodder, and that they would not think of doing without it. It is relatively cheap, deteriorates but little with age after the first unavoidable changes have occurred, is compactly

stored, easily fed, and so thoroughly relished by the animals that there is no difficulty in inducing them to eat all they are able to assimilate.

In intensive farming it may be fed the year around and is relished as well in summer as in winter. It is much cheaper than soiling crops for summer feed, and there is nothing equal to it for "short pastures."

As part of the winter ration of domestic animals it is the only available substitute for roots, and it is a great misfortune to the interests of animal husbandry that so few feeders yet realize that a sufficient amount of one or the other is indispensable to the highest bodily vigour and the largest financial returns.

Feeders as a rule do not sufficiently appreciate the fact that through unnumbered centuries of evolution our herb-eating domestic animals became habituated to conditions which made the chief part of their diet of necessity some form of fresh succulent vegetation. All of their processes of digestion, assimilation, excretion and reproduction grew into balanced action with the fresh tissues, juices and storage products of plants as essential stimulants and foods; and now when the system is long deprived of them the functions cease to be normal, because their presence in the body are now indispensable.

It is only within comparatively recent times that the absolute necessity of some form of fresh vegetable food or fruit in our own diet has been learned, and the method of canning fruits and vegetables, to be used in camp life, at sea, and on polar expeditions, as well as on the table in winter, has rendered an immense service to man in maintaining health under those conditions.

The silo is a cheap means of canning grass on a large scale to be used by domestic animals at times and in places when it could not otherwise be had; and, because silage can be produced cheaper, kept longer, and fed to stock more expeditiously, it must largely take the place of roots wherever large amounts must be stored.

ESSENTIAL CONDITIONS FOR PRESERVING SILAGE.

We have succeeded in demonstrating the past season that if green corn is put into a vessel having strictly air-tight walls, and at the same time is so thoroughly packed as to largely expel the entangled air, good silage may be made in very small quantities.

We have used galvanized iron cylinders as small as 18 inches in diameter and 42 inches deep, filling them with corn cut in half-inch lengths and simply covering with two thicknesses of acid and water-proof paper, and yet after 178 days standing in our continuously warm and sunny plant house there were only 9 inches of spoiled silage on the top. All of the balance was of excellent quality. In another silo only 1 foot in diameter and 10 feet deep, filled with corn at the same time, similar results were secured. Even so difficult a crop as green oats, just coming into the milk stage, has been kept in good condition during 60 days in the same cylinders covered in the same manner.

These observations make it clear that the only essential condition for making and preserving a good quality of silage is the close packing of suitable material in a receptacle from which the air may be completely excluded.

Whatever means may be adopted to completely exclude the air from silage will preserve it. If air can find access to it spoiling will be inevitable, and the rate will be greater the more readily the air gains access.

THE IMPORTANCE OF DEPTH OF SILAGE.

There are four important reasons in the storing of silage for making its depth as great as practicable. (1) The largest amount of feed per cubic foot can be stored in this way. (2) There is less loss at the surface during slow feeding, and because the silage is so closely packed air can enter in but slowly from above. (3) The spoiled silage at the top is less in proportion to the whole silage stored. (4) The stronger lateral pressure forces the silage so closely against the walls that if they are at all open it tends to exclude the air and the silage keeps better than when shallow.

SILAGE CROPS.

There are many crops which may be grown for silage, but practical experience points to the conclusion that plants with solid stems will make better silage with less unavoidable loss than those with hollow stems like wheat, oats, rye and barley.

Mealies for Silage.—There is no crop now generally grown which is so well suited to the production of silage as Indian corn wherever it will grow well to full maturity. The unavoidable losses with it are very small; heavy yields per acre may be secured with great certainty at moderate cost, and the silage made from it has less objectionable features than that of most other crops.

The sweet corns do not make the best silage on account of the tendency of the sugar to develop into acid. The large varieties of southern corn will produce more tons of roughage per acre than the flints and smaller dents, but the quality of the silage from these latter is much better as a rule, less acid, and it sustains less loss in the silo.

Clover for Silage.—Medium and alsike clover make good silage, but the unavoidable losses are greater than with corn and the silage is liable to have a stronger and less pleasant odour, owing apparently to the higher per centage and less stable condition of the nitrogenous compounds.

Rye and Oats for Silage.—These two crops have been used to a considerable extent for silage, but when cut into the silo green, strong odours develop and heavy losses are apparently unavoidable. If the material is put in in the more mature stage the hollow stems carry into the silo so much air that this apparently leads to heavier losses than with corn. Both these crops are better suited to summer

feeding, where a crop of oats or rye is used to keep weeds down in getting a catch of clover; they may be cut green, put into the silo and fed out at once during times of short pastures or in cases of intensive farming as a labour-saving method of handling a soiling crop.

When fed as silage, made in this way and fed out within 60 days, time enough is not allowed for serious spoiling and the development of strong odours.

Pea Vine Silage.—At canning factories the pea vines may be made into silage and fed to advantage to stock. They do not make a first class silage, but it is a good way of utilizing them as a by-product of the canning industry.

Sorghum Stalk Silage.—Mr. E. J. Myers, King's Corners, Wis., has sent to this Station a sample of silage made from sorghum stalks and leaves after the juice has been expressed for syrup. The leaves were not stripped from the canes but most of the seed was, and the samples sent were in good condition as a silage, with pleasant odour and small degree of acidity. The feeding value of this material is unknown, but Prof. F. W. Woll is making an analysis of the sample sent.

Non-Saccharine Sorghum for Silage.—The sorghums of the Kaffir corn type are likely to produce better silage than the sweet varieties on account of the tendency of the sugars to be converted into acid in the silo. The character of these plants, the heavy yields of forage and grain per acre which they produce and their ability to withstand drought are all important features of a good silage crop. While these cannot take the place of corn, where this may be grown, it is quite possible that in the warm, semi-arid portions of the United States they may be used to advantage for silage. More practical experience than has yet been had will be required to demonstrate the value of sorghum as a silage crop.

Lucerne for Silage.—If the lucerne will keep well in the silo and produce a good feed it is very likely to become an important crop for the making of silage in the dry portions of the United States. There is no apparent reason why it may not be expected to make as good silage as clover, and as there is great danger of its losing its leaves when being cured for hay the silo offers an important means of saving this loss, provided only that it will make good feed when so preserved. Practical experience, however, is too limited to furnish a basis for safe judgment at this time.

STAGE OF MATURITY OF CROPS FOR SILAGE.

The most exact knowledge we now have upon this subject indicates that generally crops will make the best silage when they are cut as near full maturity as possible and yet have their tissues filled with sap. When corn is put into the silo in a very succulent state it is filled with a large per centage of compounds which are easily decomposed, and this not only makes the unavoidable losses high but it is

likely to cause unpleasant odours and less palatable feed. Besides, there has not yet been developed enough of the woody tissues in the plant to enable the juices to be retained under the pressure of the silage, and in early silo practice provision was often made for drainage on this account.

Corn is in the best stage for the silo when it is in the best stage for cutting and putting in the shock; that is, when the ears are fully matured but the stalks, leaves and husks are yet green.

Clover for the silo should be a little more mature than for making the best hay, that is, the bloom should have well begun to turn brown.

In practice it will, of course, be necessary often to put some of the corn into the silo a little too early for the best results in order that the last may not be too dry; but judgment in planting at different times and in cutting that which on account of differences in soil or variety has matured first will usually give two or three weeks for the filling season if that time is needed.

DRYING AND WETTING SILAGE.

It should be kept in mind that little is gained in letting a too succulent crop lie and wilt after it is cut, before putting it into the silo, because the drying of a crop usually means the replacing of more or less of the water lost by evaporation with air in the tissues which when carried into the silo favours fermentative changes there.

If the corn or clover is put at once into the silo while the tissues are yet alive the active cells use up at once a large portion of the air necessarily entangled in it, and when this is done the fermentive changes cannot go on, but if the plants are cut and allowed to wilt the cells become less active and thus are unable to as completely exhaust the oxygen in the silage air.

If a crop has become too dry to go into the silo in the best condition the wetting of it may help somewhat to preserve the silage, but it must be kept in mind that water cannot take the place of the natural juices and the activity of living cells. If leaves and stalks have become dry the cells have become filled with air and the adding of water can only partly displace it. Its chief help is in softening the tissues and helping the silage to pack more closely.

RATE OF FILLING THE SILO.

So far as the making of good silage is concerned the rate of filling may be as slow as the stage of maturity of the crop will permit. Slow filling is preferable to rapid filling in that it gives the silage more time to settle and for the first heating to expel all of the air not consumed by the tissues while alive and active. A steady filling at the rate of perhaps 8 to 15 tons per day for small and medium silos is best, or the filling may be done more rapidly on alternate days; but the silo should not, as a rule, stand longer than two days between

successive fillings. Longer intervals may of course intervene when emergency demands it, but there will always be a loss of feeding value in the silage as the result.

DANGER IN FILLING THE SILO.

It never should be forgotten with the filling of silos, that carbonic acid is generated very rapidly the first few days after silage is put into the silo, and it sometimes happens when a silo has stood over night, if the air is very still, and if the surface of the silage is a considerable distance below any door, that carbonic acid accumulates in sufficient quantity over the silage to make it impossible for a man to live in it. Cases are on record where people have been suffocated by going into a silo under these conditions. If the doors in a silo are so close together that a man standing on the silage will have his head above an open door the carbonic acid gas will flow out of the door and not accumulate to such an extent as to be injurious.

In cases where the silage is below any opening far enough to leave a man's head below the opening, care should be taken not to go into the silo in the morning after filling has begun until after the machinery has been started. After the silage has been dropping into the silo for a few minutes it will stir the air up sufficiently to render it pure enough for a man to work in it without danger. Ordinarily the air currents outside are sufficiently strong to prevent the carbonic acid from accumulating, but it should be kept in mind that it is possible on still nights for this accumulation to take place.

PUTTING MATERIALS INTO THE SILO CUT OR WHOLE.

Corn and any of the crops suitable for making silage may be put into the silo just as taken from the field, but the labour of thoroughly packing and the labour of feeding out will be enough greater to pay for the extra expense of cutting in all cases where more than the equivalent of 20 head of cattle are to be continuously fed. In the case of corn, too, the silage will be eaten more completely if cut. If the power and cutter are on the farm, then the silage should always be cut into the silo. In regard to length of cutting, this will depend somewhat upon the available power; as a general rule the feed cut into half-inch lengths is best, but more power is required to do this.

The shredder may be used instead of the cutter if one has this and not the other, but it will not essentially improve the feeding qualities of the silage and will require considerably more power to run it.

IMPORTANCE OF TRAMPING SILAGE WHEN FILLING.

Attention has not been sufficiently called to the importance of thoroughly compacting silage at the time of filling the silo. The immediate and continuous thorough tramping not only enables a much larger amount of silage to be put into the silo, but it expels at once a large volume of air which, if allowed to remain, prolongs the changes which occur."—EDITOR.

Cultivation of Fodder Crops.

An article in the *Melbourne Weekly Times* calling attention to the value and importance of "artificials," as cultivated fodder is called in England, is interesting to ourselves, as the condition and climate of this country and Australia are in many particulars alike. We may say, however, that one-half or thirteen million of the sheep in the British Isles are kept on arable farms, and this not only for feeding the sheep, but through the system of rotation of crops which implies manuring, the enrichment and conservation of the soil. It is most satisfactory that such general attention is aroused to the value of lucerne cultivation, but the fodder plants which occupy the land a short time are valuable in their turn and usefulness:—

"The cultivation of fodder crops has hitherto been greatly neglected by many Australian farmers and graziers, whose live stock in many cases are entirely dependent upon the natural pastures for their supply of food. This supply is, owing to severe summer droughts and other causes, very uncertain for several months in the year, and consequently the unfortunate animals are often reduced to a state of starvation, or very nearly so. Though, as a matter of course, the evil effects of our long summer droughts cannot be altogether prevented, yet it is quite possible for farmers to mitigate the evil results by the exercise of some little judgment and care. There is no reason why live stock should be allowed to perish in large numbers every year, as is the case now, for want of food, when the requisite supply to tide them over periods during which the natural pastures are withered up can be provided at a moderate cost. At certain seasons of the year vegetation is luxuriant, and there should be no difficulty in growing fodder crops suitable to the circumstances of every kind of soil and locality, and these, if not required for use in a green state, will, if properly harvested and husbanded, afford the necessary supply of feed when the pastures are useless. By the cultivation of fodder crops, the stock-breeder may always safely calculate on having surplus produce in times of abundance, which can be preserved and utilised for periods of scarcity. As the breeding of sheep and cattle by farmers must in the future become general in the practice of agriculture, it will be necessary to raise a larger and more reliable supply than can be obtained under the careless system now too frequently followed, and the cultivation of fodder crops will doubtless receive more attention in the future. Graziers who devote themselves entirely to the rearing of sheep and cattle from vast tracts of natural pastures will also find it to their advantage to utilise their land to a greater extent than at present by devoting portions to the raising of serviceable fodder crops that will help them over times when grass is scarce.

Different conditions and different crops.—In making a selection of fodder crops, the cultivator must duly consider the nature of the soil, climate, and other local circumstances, as unsuitable kinds are not

likely to give satisfaction. In the Australian colonies there is a very wide range of climate, and there are soils of every description; consequently, among the many valuable fodder crops in cultivation, while some will thrive well under peculiar conditions, others will be perfectly useless. But from the list suitable plants may be selected to suit the peculiar requirements of any soil or climate. Excluding the grasses, of which there are a large number of valuable species, many of them being but little known, we will briefly call attention to the merits of a few fodder plants that may be cultivated advantageously by Australian farmers and graziers. Cultivators must, however, remember that neither the absolute nor comparative value of the various crops can be fixed with any certainty, and it will necessarily vary materially, according to local conditions, and a correct estimate can only be based on experience. It must also be remembered that the value of fodder crops does not depend altogether upon the bulk they yield, but on the quantity of nutriment for live stock that can be produced from a given area.

An important point.—Another material point, in estimating the value of a fodder crop, is its adaptability for preservation in a dried state till required for use without losing its nutritious properties to any extent. Some crops will yield a much larger proportion of digestible food than others, and the nutritive value of the same plant will often vary materially, according to the stage of growth at which they are cut, and the time occupied in the process of drying.

When to cut.—As a general rule, fodder crops should be cut just as they are coming into flower, because at that stage of growth the stalks contain a large proportion of saccharine and other nutritive matter which will be preserved in the hay. If the crops are cut before they reach the flowering stage, the juices of the plants are not so rich and nourishing; and, on the other hand, if the cutting is delayed till the seed begins to form, the stalks become fibrous, lose a large portion of their nourishing properties, and are not so easily digested by stock.

The most generally useful.—The most generally useful of our fodder plants is lucerne, because it will adapt itself to various soils, climates, and other local conditions better than any other. It may be grown with more or less success in districts where excessive heat and drought prevail in the summer. It will thrive very well in the more elevated districts, where the climate is cool and moist, and it flourishes in the temperate regions. It will hold its own in any kind of soil that is fit for cultivation, and will yield food for stock when the natural pastures are dried up from the effects of summer droughts or winter frosts. Being a perennial plant lucerne is a crop that does not require renewal frequently, and will last for ten, twelve, or even more years when grown under favourable conditions. Though lucerne may be grown with more or less success in almost any kind of soil, it will only flourish to full perfection in well-worked, deep, rich open ground. When grown under favourable conditions, it yields a large bulk of nutritious feed for stock, whether the crop is

utilised by grazing it, cutting it for green food, or drying it for hay. Lucerne contains a larger proportion of flesh and fat forming materials than clover or vetches; it is greatly relished by all classes of farm live stock, and it makes a valuable hay when cut at the right time and carefully cured. When the nature of the ground will permit, the roots penetrate to a great depth, which enables the plants to withstand drought with comparative impunity.

About Sainfoin.—Sainfoin is another valuable fodder plant belonging to the same natural order as lucerne, which may be cultivated advantageously under certain conditions. It is a deep-rooted perennial plant, producing strong stems, and under favourable circumstances will last five or six years. It thrives well in marly, chalk, or limestone soils, and is worth trying in some of our great wheat-growing areas, and the Murray, Darling and Murrumbidgee districts of New South Wales. Sainfoin may also be grown as an annual crop, to be followed by wheat, for which it leaves the ground in excellent condition.

Another good Fooder Crop.—Tares or vetches make an excellent fodder crop for many localities, if treated liberally and sown during the autumn or early spring. They thrive best, however, in clayey loamy soils in the cooler districts, and afford a large amount of nourishing food, which may be used either in a fresh or dried state.

Plants for Summer Cultivation.—Maize, sorghum, imphee and millet are invaluable fodder plants for summer cultivation in rich soils that are fairly supplied with moisture, and should be generally cultivated when the local conditions are favourable.

All are excellent for use in a green state, and if not required at that stage they can be easily turned into dry fodder, which, though rather coarse, is very nutritious, and much relished by all classes of stock.

There are many other plants that might probably be turned to good account for fodder purposes, but those named have established reputations, and are known to be well adapted to the wants of Australian cultivators."

Silos.

The silo is now coming with a rush in Oregon. They will be built this year by the hundred. The number of cornfields which will dot the country in the dairy districts will give the landscape a more familiar aspect to visitors from the East. Corn silage and clover or vetch hay require only a small daily ration of bran or pea-meal to give a cow a balanced ration which she will highly appreciate.—*Rural North-West.*

Improvement in Wheat.

Special attention is being given in England to the improvement and selection of seed wheat. Different varieties are crossed and new varieties obtained by the operation known as inoculation. This is especially useful in the case of wheat, because from the form of the flowers, and their habit of blooming, each flower is self-fertilized. The male and female organs being enclosed together, so that the result is in-and-in breeding in perpetuity. To this fact is attributed the failure of at one time a good variety of wheat. Another plan adopted is the selection of the finest grains from the best ears again and again repeated. This method was practised by Major Hallett, whose well-known experiments showed that in four years the ear of wheat increased in the following ratios :—

		Length in inches.	Containing grains.	No. of ears on finest stool.
1857	Original ear ...	$4\frac{3}{4}$	47	—
1858	Finest ear ...	$6\frac{1}{4}$	79	10
1859	Finest ear ...	$7\frac{3}{4}$	91	22
1860	Ears imperfect from wet season ...	—	—	39
1861	Finest ear ...	$8\frac{1}{2}$	123	52

Thus the length of the wheat-ear was nearly doubled, the contents almost trebled, and the tilling power of the seed increased fourfold.

—EDITOR.

STOCK FARMING.

Fine-Woolled Merinoes.

In the late Melbourne Sheep Show the ram Rover won the championship in the hand-fed, fine-wool class of merinoes, of which we are indebted for the above copy of a photo to the *Australasian*. Rover was the property of the Honourable James Wilson of Bellevue, Tasmania, and no doubt is a good representative of this fine-woolled breed of merinoes in Australia. With the exception of a few flocks in Saxony, these sheep produce the finest wool known to manufacturers.

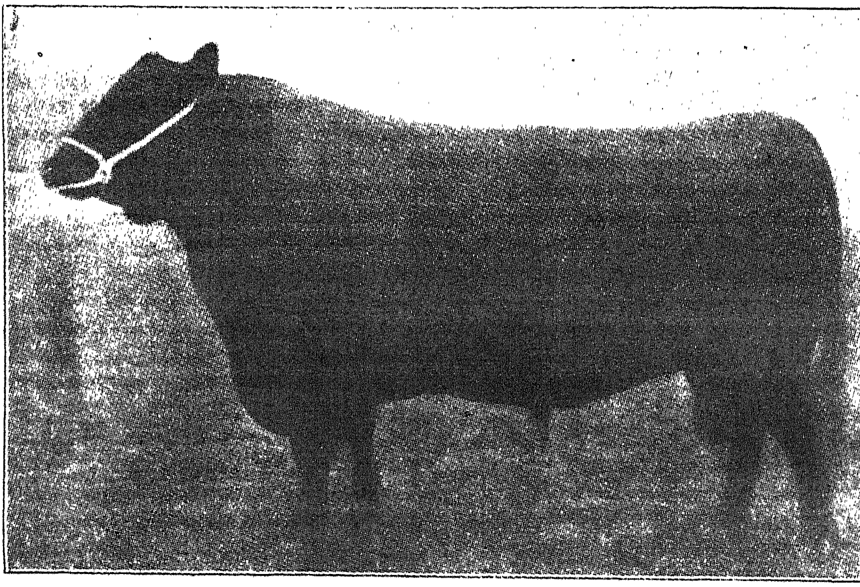
From time to time sheep of this class and breed have been imported into this country and have tended very much to establish some of the best flocks in the Colony.

The late Mr. John Irvine, during his trip to Australia, visited Mr. Gibson in Tasmania, and obtained a ram and two ewes, which he brought home with him to his farm at Waterford. Mr. Arnold also,

CHAMPION RAM, ROVER.

during his visit to Australia, secured amongst the sheep he selected, we believe, one or more of Gibson's Tasmanians. There is at present a great amount of controversy between the old-established breeders of the fine-woolled sheep and the patrons of the Vermonts. It is claimed that the Vermonts grow the heaviest fleeces, but it is admitted the highest class Australians produce the finest wool.—EDITOR.

Polled Cattle.



Aberdeen-Angus Bull, Diaz.

The chief breeds of polled or hornless British cattle are the Galloways and Aberdeen-Angus in Scotland, and Suffolks and Norfolks in England. There are also small herds of wild polled cattle in the parks of Chillingham in Northumberland and Chaterherault in Lanarkshire, living distinct from the horned wild cattle in the same parks. Occasionally, in all breeds of horned cattle, there are bred individual animals that never get horns, but remain polled. Whether this is a case of throwing back, as it is thought to be with black sheep, or defective organization, one thing is certain, that, as with black sheep, this polled condition is or may be hereditary. And as flocks of black sheep and goats have been established, so herds of polled cattle may be obtained by the proper management of these hornless sports in horned breeds. This hereditary principle has been turned to good account in establishing herds of polled Durhams or shorthorns, Hereford and other breeds. Cattle of any horned breed which have become polled retain all the good points and qualities of the breed to which they belong, and have only lost that which was no use to themselves or their owners.

The two most popular breeds at present are the Red Polls and the Aberdeen-Angus, the first under the skilful management of the late Mr. Coleman. It had become one of the most valuable and favourite breeds of British cattle, and we are pleased to learn that Mr. Southey proposes to give them a trial alongside his Devons at

Schoombie. He is a believer in polled cattle, for he has dishorned all his Devons, heifers and bulls, for the last four years, and finds it an advantage in many ways.

It is claimed for the Aberdeen-Angus cattle that they especially possess two good qualities. They are exceedingly hardy in constitution and yield top quality beef. And even for early maturity they may be commended. They are not, like the Red Polls, good dairy cattle, which with us is all important. The bull Diaz was exhibited by Mr. Adamson at the Royal Agricultural Society's Show at York, when he won the first prize in his class and the champion gold medal of the Polled Cattle Society. Diaz was calved in 1896. One of the most famous breeders of these cattle was the late Mr. McCombe, whose famous herd and his successes at the Paris Exhibition of his day forms a most interesting chapter on cattle breeding.—EDITOR.

Cape Mohair.

That mohair has been dull for some months past, and like wool selling at lower prices, is too well known to our Angora farmers. But while the prices of all kinds of wool are generally lower, with regard to mohair it has been reported that while the demand for Cape in Bradford is slow and its use restricted, there is a demand and preference given for Turkey by the manufacturers. As this is a most important matter we are glad to see a letter in the *Midland News* from its Bradford correspondent, Mr. Hollings, which discusses the probable reasons for this preference of the manufacturers and deals with several other points interesting to our Angora goat farmers, and we shall be pleased to receive any notes from Angora men in ontinuance of this important and interesting subject:—

CAPE MOHAIR.

Cape mohair seems to me to be standing to-day in rather shallow water, and whether or not its going astem or astern depends a good deal upon the growers of the article—in fact, I make bold to say that everything nearly rests with them—I have always had a strong objection for qualifying for the ignominious post of "calamity howler," for the simple fact that my temperament is cast in an optimistic mould, having a strong repugnance for pessimism and that which savours and dwells on the black side of things.

CAPE VS. TURKEY.

In speaking of Cape mohair there is, however, just a little that makes one pause, put on his "thinking cap," and ask the reason why it is Bradford users are not devoting that attention to the Cape grown article that they have lately done to Turkey mohair. On more than one occasion during the past year I have said that Cape

mohair has not gone anything near so readily into consumption as has Turkey mohair, the simple reason being that the Cape grown article, speaking generally, does not show such an average degree of quality as does Turkey mohair, and as the class of trade done during the past two years has demanded the use of good quality mohair, Turkey sorts have been by far more largely availed of than Cape sorts. As one dealer said to me not long ago, "You see, Mr. Hollings, Cape firsts, speaking generally, are very well suited for braid yarn purposes, plushes, linings, and upholstering purposes, but when it comes to the best work, that is, the supplying of yarns for dress goods purposes, we must have the finest and best samples that are grown, hence we turn to those grades of mohair grown in the Beybazar district of Asia Minor, and which for quality, colour and lustre cannot yet be equalled by the mohair grown in any other part of the world. There is no doubt that a few noted flocks in Cape Colony do produce a class of mohair that suits the purposes of the best trade, just as well as does the best Turkey mohair, but we have to take the thing in its general aspect as we find it comes to Bradford, and here it must be said that Cape mohair is below the average in point of quality when compared with Turkey. It is simply a question of quality, length and condition, and these three features, but more especially the first, will have to be attended to if Cape mohair is to rank as being equal to Turkey."

A HIGHER STANDARD OF EXCELLENCE.

The above frank expression of opinion, based upon a good many years' experience in the trade and confirmed also by everybody else having to do with mohair, makes it imperative for those interested to look at this subject and see what can be done towards making good the deficiency, and thus removing the source of complaint. I can easily understand some reader thinking that his fleeces are as good as can be grown in any part of the world, but this no doubt is the result, to a large extent, of a little conceited pride for his own flocks, and which to a large extent is justifiable in the case of everyone.

CAN CAPE BREEDERS DO BETTER?

But the question I put to such breeders is this: Is that breeder resting content with his present attainment, or is he straining every nerve and adopting those methods by which a higher standard of excellence can be reached? From what I know of Angora goats and the principles of mohair growing, I hardly think that any man yet in Cape Colony has reached finality in breeding and rearing Angora goats. For one thing the animal has not been upon the ground so long as to become acclimatised, and fixed in all its habits and methods of procedure, and possibly there has not been that general culling and weeding out of inferiors that there should have been. Like sheep, but in a more pronounced degree, Angora goats show a strong tendency to deterioration in their best essentials, reverting back to their original state, and more so because they are bred upon

ground which cannot yet be called their native country. If this be correct, in what special one particular do Angora goats show a falling off, particularly when they have got past their prime and begin to age? In the quality of their fleece I should say, just like sheep do, and if my reasoning be correct or not, it is exactly here that the Bradford trade calls the attention of those breeding Angora goats and growing mohair in Cape Colony. What then do I mean, and what does the Bradford trade mean when speaking of quality? Let us inquire into the subject, and see if we cannot have a clear understanding of what quality means.

WHAT IS MEANT BY QUALITY.

To give readers a clear understanding of what is meant by quality is a more difficult job than what it looks to be. By quality is generally meant the length or fineness to which a fibre will spin, for the finer or smaller the fibre is, the longer and smaller it can be spun.

TRADE TERMS—60's, 40's AND 80's.

It is this fact that makes us speak in the wool trade of the raw article being of 60's or 40's quality, or any other count as the case may be. Any man can see that to spin out a wool of 60's quality will require a much finer article than he will if he spins out a 40's quality wool, but while it is possible to spin a wool only to the length of 40's quality, it is absolutely impossible to spin a 40's wool to the length of 60's.

It is a scientific fact that you can spin down a wool to any count below its own natural length, but you can never spin up a wool beyond its natural limit. When we speak of 60's quality wool it simply means that there are 60 hanks, each hank measuring 560 yards, to weigh one pound, or in other words there are 33,600 yards of spun yarn of this quality to every one pound weight of material. 80's quality is a much finer quality wool still, and this means that it will spin to 80 hanks of 560 yards each before it will weigh one pound, or really a production of 44,800 yards to every pound in weight. Such a statement, which is actual fact, lends itself to much imagination, for such yarns when spun are indeed small, one single pound of 60's reaching over 19 miles in length. If mohair growers will bear these facts in mind and apply the same principle to mohair, they will see how important a thing it is to maintain good quality in their flocks. Spinners affirm that it is impossible to produce as small a yarn, generally called in the trade "fineness," from the majority of Cape clips as they can from Turkey mohair, and it is this fact that has kept the Cape article in the background during the past two years.

FINE HAIR WANTED.

Perhaps some reader will say—"Why then not spin Cape mohair to as long a length as it will go, and then use it as it is?" That is all very well as far as it goes, but if mohair growers were at all conversant with the principles of textile mauufacture they would know this, that the finer or smaller the yarn the smarter will be the

fabrics into which they enter and from which they are made. And it is exactly here that makers of dress goods for women's wear demand the finest of yarns that the spinners can produce, for they know full well that there is nothing so obnoxious to the taste of the gentler sex as coarseness and openness in their wearing apparel, while the finer or smaller the yarns the more they lend themselves to ornamentation in weaving. It is this fact that makes quality rank as the first essential in both wool and mohair, for it is a well-known fact that the finer the wool, consistent with other essentials such as length and soundness of staple, that makes fine wool more valuable than that which is coarser and more open in the staple. If South African mohair growers will bear in mind these principles and try to incorporate them in rearing and breeding their flocks, they will do a great deal to remove the stigma or rather complaint which attaches to their mohair. No man need to be told that there is always plenty of second rate stuff in the market, but what we want to-day, and will always want, is first-class stuff, the most room always being at the top.

In the *Agricultural Journal* for October 25, page 530, I see there is an account given of a mohair fleece being sent to Bradford to be judged, grown by Mr. G. A. Pears, of Jedbury, Tylden. We offer no criticism on the report given, suffice for me to say that some surprise seems to have been expressed at the report, everything being satisfactory except the *quality*, which is spoken of by the Bradford judge as "the only thing lacking." I hardly think that no matter what the judges at shows might have said, and which has undoubtedly been excellent when compared with other Colonial fleeces, that the Bradford expert's opinion can be questioned, Mr. Pears' fleece no doubt being judged from the highest standard of excellence as seen in Turkey fleeces, and which growers must bear in mind is the standard article of the trade. "Quality" as is mentioned by the editor of the *Journal* includes "fineness and lustre," and are indeed two "most important" essentials in judging all mohair, but I would point out that fineness of fibre ranks the first always, for it may be relied upon that where you get fineness of hair, lustre and brightness will be present also. I have tried to formulate a table that will give mohair growers some data by which they may reckon or judge their fleeces, and I would particularly request their attention to the following table, which I think is not only unique, but which if embodied by goat breeders in their flocks, acted upon by judges at the shows, it will meet with the approval of buyers of Cape mohair in Bradford. The following is the table :—

STANDARD POINTS IN JUDGING MOHAIR.

QUALITY OF FLEECE.	Points.
Fineness and character	25
Lustre, brightness and colour	23
Evenness of quality all over fleece	15
Strength and elasticity of staple	5

WEIGHT OF FLEECE.

Length of staple	20
Density of fleece	6
Evenness and fulness of covering	6
Total points	100

Of course, I do not send this table forth as being infallible, but it seems to me to represent a general outline that can be fairly relied upon in judging a mohair fleece.

FALSE PACKING.

Another point needs emphasising. I was talking with a leading member of the trade only yesterday, when he informed me that the quality of Cape mohair was decidedly below that of two years ago. The habit of packing kids and firsts together with the object of palming off firsts as kids was so extensively done that the trade and growers were suffering seriously as a consequence. Once more let me say that the false packing of Cape wool and mohair is to be greatly deplored, and it is high time that this stigma was removed from Cape produce. Pack kids separate from firsts, for it is a grave mistake to think that the one is equal to the other. Let kids be kids, and firsts, firsts. Look well to culling and weed out all inferior animals, and especially those showing a tendency towards coarseness.

AN OFFER.

I would just like to say in conclusion that if any Midlands goat breeder wants an expert opinion on the character of his mohair I shall be most happy to show for him a sample fleece to the best dealers in Bradford, and to give him a frank and honest report thereon. What I ask for the trouble will simply be that I keep the fleece as sent. It can be sent by parcels post and addressed to my country place of business—S. B. Hollings, Calverley, near Leeds, England.

S. B. Hollings.

Bradford, November 23.

Harvesting Mealie Fodder.

An American farmer writes thus to the Texas *Stock and Farm Journal*:—

"I advise every farmer to cut up his corn (mealies) rather than pull the fodder, and know from ten years' experience that it will pay to do so.

In my opinion there is no hay nor roughage of any kind equal to good bright corn fodder, pulled and cured the old way, but counting

the expense of pulling and the waste of stalks, it makes the cost entirely too much. The shredded stalks stand about half way between good straw and well cured bright, sweet hay, all of which fall below the pulled fodder in feeding value.

Ten years' experience has taught me some lessons about handling the crop from cutting to feeding, a few of which I will mention for the benefit of those who have had no experience.

1. Let the corn begin to harden before cutting. It is all the better if a few brown shucks show occasionally. Do not cut it too early or you will lose weight in both stalk and ear.

2. When you are ready to cut, let one man go ahead of the cutter and tie up foundations for the stock by bringing the tops of three or four hills of corn together and twisting them about each other in such a way that they will brace each other and thus form a solid foundation. Of course it will be necessary to select two hills from one row and two opposite hills from the next row, so that a square is formed when four hills are used. If your stalks are not conveniently situated three hills will do. Do not cut these foundation stalks, but fasten the tops together as suggested, and around these stalks build the shock by placing the corn carefully around, slightly leant to the centre.

When four or five armfuls have been placed evenly around the foundation select a rather tough stalk and break between each joint so as to allow the stalk to bend, and bind all together firmly about two-thirds the way to the top. Now finish the shock by placing corn evenly all around until the spread of the bottom is from four to six feet in diameter. Do not under any consideration make very small shocks, as the exposure to weather causes too much loss. When the shock is done draw a twine string snugly around near the top by slipping one end through a noose and tying with a bow or loop knot. When the corn has cured a few days go around and tighten up all the strings, which will get loose from shrinking of the corn.

Binder twine is well suited to tie the shocks, but if nothing else is available, corn stalks or crab grass twisted together will do, but the twine is best, and, counting time saved, much the cheapest, as the strings can be saved and used several years.

If the weather is unfavourable for curing when cutting time comes, make the shocks about half size. When partly cured go back and finish to full size. Of course only half the corn should be cut when going through the first time, the other half being allowed to stand until the time to finish.

Great quantities of valuable cow food are allowed to go to waste all over the South, while it had better be saved and fed to beef or dairy cattle.

I believe that this is the best way to save this crop, and advise its adoption in place of the present method of pulling fodder, but at the same time caution against the extravagant claims made for it by enthusiasts and by manufacturers and agents of shredding machinery.

When a venture is made in any new industry and results fall below what is claimed, there is sure to be disappointment, followed by a reaction that leaves the matter in worse condition than if no start had been made."

Wild Domesticated Cattle.

A correspondent writes:—A well-known Lothians farmer, who is far too busy to be much of a sportsman, has had a lot of "big game" thrown upon his hands just now, very much to his disgust. This farmer, who is one of the most extensive landholders and stock-owners in the country, had bought some considerable time ago a lot of big Highland bullocks, which he sent to graze on an outlying hill farm in his possession. As the farm in question was well fenced and the pasturage was good, the bullocks had required, and got, very little attention from anyone during the summer months, and had, in fact, been roaming about wild on the rough pasture. Possibly, also, there had originally been among them one or two animals in which the feral nature had been developed in an unusual degree, and these animals by their wildness had brought out the latent wildness in the other members of the lot. In any case, the animals had become very wild, so that when the owner recently went to the farm to have a "round-up" of his stocks in view of Hallow Fair, he found the Highlanders more dangerous to come to close quarters with than were the so-called wild white cattle in Cadzow Forest. All efforts to "round-up" the cattle were found to be unavailing. There was nothing for it, therefore, but to shoot the animals, and accordingly one day last week the owner invaded the farm at the head of a band of sharpshooters, followed by a complete transport service of wagons, hoisting apparatus, etc., &c. It was no easy matter, however, for the sharpshooters to get within range of the wild cattle, but by adopting the tactics of the deerstalker and the Boer sniper they managed to "bring down" seven of the Highlanders. The carcases of these seven Highlanders were taken away on the wagons, and the stalking of the other Highlanders on the "kopjes" will afford plenty of excitement to the owner and his friends during the next few weeks.—*Glasgow Herald.*

Docking Horses.

Speaking at the luncheon held in connection with the Kington Horse Show, Lord Coventry had something to say about docking, a subject on which he said he felt very strongly. So many men, so many minds, and all tastes, we were told, said his lordship, were respected; but at the same time he could not see how anyone could

admire a very short tail pulled and drawn so as to resemble a shaving brush. He could not see how they could possibly call such an adornment beautiful; the mane and the tail were two of the most perfect attributes of its nature. From what he had seen in the course of his peregrinations about the country he thought the docking of the horses' tails was a passing fancy, and seemed to be dying out, particularly amongst young horses. Very few of the latter were now shown with docked tails, and it was not only an improvement as regarded their appearance, but it was also an advantage to the farmer and the breeder to allow the tail to grow long, because the animals were then available for carriage horses and chargers, which they would not otherwise be. He thought it was a mistake to dock them, and he trusted that in future years they would see longer tails, and then those who bought the horses could use their own judgment as to whether they would have them cut or not.—*Mark Lane Express.*

HORTICULTURE.

Eastern Province Horticultural Board.

The Board met in East London November 9th, and held its meeting in the Council Chamber by kind permission of the Mayor, A. O. Lambart, Esq. Before proceeding to business His Worship extended a cordial welcome, to which the President suitably replied.

There were present: A. J. Fuller, Esq., President; M. Preston, Cathcart; Jas. Leighton, King William's Town; J. Warren, Stutterheim; P. Kidwell, Albert; Hy. Neville, Albany; J. B. Leach, Queenstown; and Hon. Sec. W. Goulden.

Minutes of previous meeting were read and confirmed.

Subject, Prizes for Orchards, was discussed, and letter from Department read in which it was hoped that next year competitions might be arranged. Secretary was instructed to post up the President during next session of Parliament so that a sum of money might if possible be placed upon the Estimates for the purpose.

Secretary called attention of the members to the desirability of filling up the fruit circular, and urged that the fruit-growers in the various districts represented should be asked to give their earnest attention to the matter.

Report of the Senior Analyst on the soils of Cathcart and Komgha was laid upon the table.

A discussion on the desirability of asking Government to add to the collection of fruit models of desirable varieties took place, and the Secretary was instructed to ask the Department to obtain specimens of fruit grown in the Western Province to be shown at the forthcoming Horticultural and Agricultural Shows.

Disease in pines and the desirability of obtaining new varieties after short discussion was decided to be held over in the absence of the representatives of East London and Lower Albany, and that the Department be informed that information would be obtained relative to the disease in pines with a view of addressing Government at next meeting of the Board.

Insects Pests Bill.—Letter from the Department read to the effect that no legislation was contemplated this year. Secretary was instructed to request that no further action be taken in this matter before this Board is consulted.

Locust Destruction.—Letter from the Department was read, and it was decided to discuss it in committee. The result being that the President (J. Warren) and Secretary be a committee to draw up a scheme to submit at the next Board meeting.

Alteration of "Model" to "Experimental" Orchards.—Secretary pointed out that Government, acting apparently upon the resolution of Congress, had deliberately broken the contract already entered into with the owner of the land at Egerton before the resolution of Congress was passed, and urged the Board to put itself into a satisfactory position with regard to the matter, otherwise it would become a party to the breach of contract. Resolved that the Government be advised that it was not the intention of Congress to upset existing arrangements with regard to the "model orchard" already established at Egerton.

Secretary reported the vine cuttings at Fort Cunningham had been destroyed.

Secretary called attention to the relationship between members of the Board and the Associations in the districts they represented, and urged that close touch should be maintained between them, and that all matters relating to fruit culture should be brought to the Board through its representatives, thereby increasing its prestige and usefulness.

Circular letter of invitation was read to all fiscal divisions urging fruit-growers to combine and elect a representative upon the Board, but so far only Tarkastad had responded. Mr. Leach pointed out that many reasons unfortunately existed at present which prevented the Board's intentions being fulfilled, but trusted very shortly these difficulties would be removed and that every district in the Eastern Province would become alive to their interests and join the Board.

Requirements of Fruit Growers.—Messrs. Preston, Nelson and Secretary were constituted a committee to arrange with some commercial house to stock netting, packing boxes and fertilizers, etc.

Resolved that the next sitting of the Board take place in Graham's Town. Secretary to arrange.

Votes of thanks to Mayor and Town Council, Press, President and Secretary were passed.

Vine-Growing in South Africa.

Dr. Moszeik, of East London, says Mr. Krichauff, reports that up to 1891 no less than 78,500,000 vines had been planted there, producing 5,000,000 gallons of white and 1,000,000 gallons of red wine; also 1,500,000 gallons of brandy and 1,500,000 lb. raisins. Since then the phylloxera reduced the produce. Even in 1891, 8,000,000 vines had already been destroyed. The Government has, however, acted wisely in at once procuring cuttings of American resisting vines. These were sold cheaply, and prizes were given for successful plantations. Most of the wine is still made in a very primitive fashion, but to show the great productivity of the soil he gives the production of wine elsewhere as mentioned by Von Babo. For Germany, Hungary and Algiers an average of about 44 hectolitres (1 hectolitre, 22 gallons) is produced per hectare (2½ acres, 211 gallons per acre); in Spain, Greece and France, 17 to 18 hl.; in Switzerland, 42 hl.; nearer the coast in South Africa, 86 hl. (516 gallons per acre); and in the interior up to 173 hl. Dr. Moszeik states that at Worcester, Montagu and Ladysmith as much as 287 hl. per hectare have been pressed. This would be about 2,500 gallons per acre.—*Garden and Field.*

DAIRYING.

Some Points in Milking.

A few remarks on the milking methods adopted at the Ontario Agricultural College by Professor H. H. Dean, should prove of interest to Australian dairy farmers. After speaking of the necessity for cleaning the cow, etc., he says:—" We ought to have a clean pail and a clean person to do the milking. Every person should wash his hands before commencing to milk. A basin and a towel should be part of the furniture of every cowshed. Then the cow's udder and the under part and sides of the animal should be brushed off with a soft brush or damp cloth to take off all the dust and

bacteria which are going to drop down into the milk. Then you are ready to commence working—a clean man, a clean pail, and a clean cow.

Some bacteriologists tell us that if we will throw away the first four or five streams that come from the cow you will never be troubled with gassy milk. They say these bacteria crawl through the little openings in the bottom of the teat and multiply very rapidly. The first few streams of milk wash these bacteria down into the milk pail, and bacteriologists claim that if you will milk this on the ground, and practise that day after day, there will never be any gas in the milk. I doubt if you can get milk suppliers to do that. If the average man or woman were to see these streams going on the ground they would think they were ruined—why, there is a whole tablespoonful of milk wasted! We have made some experiments with milking the two furthest teats, and then the two next, instead of of the two front and two hind ones, as ordinarily done. Our experiments have shown no advantage in glandular milking.

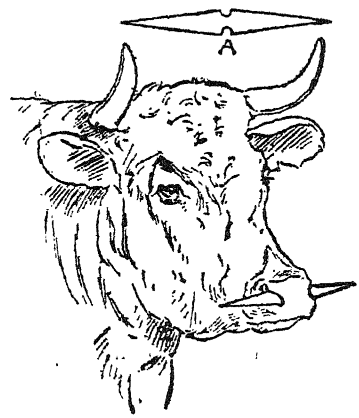
As to the number of times a cow should be milked, I am convinced of the fact that if you milk a cow three or four times a day you will get more and richer milk than if you only milk twice a day. That is why our sharp, shrewd dairymen practise milking three times a day at these dairy tests. But it is a question whether in ordinary farm practice it would pay. Why does it cause the cow to give more milk? Because you excite the glands to a greater degree. You make a greater demand on the cow, and the best dairy cows respond to the demand as far as possible. Then the cow should be milked out quickly and milked clean. It is the nature of the cow to give milk rapidly, and any person who takes a long time to milk will never get as much milk as the one who milks fast. Milk the cow out clean, because if you do not take all the milk from her she comes to the conclusion there is no use bothering to make more milk, because the milker does not want it, and by-and-bye that cow will dry up. You want to make her believe that you are after every drop of milk, and if there is any sympathy between you and the cow you will get it."—*Sydney Farm and Dairy.*

Holding Back the Milk.

According to Professor Stewart, the following is the explanation why cows sometimes hold up or keep back their milk. The production of milk is due to a nervous action of which the glandular substance of the udder is broken down into milk whenever the cow is influenced by sufficient excitement of the right kind. It depends upon the structure and function of the udder just as much as the secretions of other glands do, which we know are wholly subject to a set of nerves controlling this distinct function. The udder is not a mere vessel for

holding milk that is supposed to be secreted continually and gathers in the udder, as one may suppose a constant dripping of any fluid would fill any receptacle. On the contrary, it is a gland, made up of cellular substance, which grows by separation (from the blood) of the matter required; when it has attained maturity, or when the necessary nervous action occurs, it breaks down into a special product —milk. There are many such glands—the salivary, the lachrymal, the pancreatic, and others—whose action is well known to be dependent upon that part of the nervous system connected with it. A simple illustration may be given in the lachrymal glands by which tears are produced. Sudden excitement acts on the brain, and this communicates with the special nerves the effect to the glands involved. Then occurs a flow of tears far in excess of the ability of the cells of the glands to contain at any one time, and this continues until the nervous action subsides, when the secretion no longer goes on. The same occurs in the stomach when food is swallowed. The action of the nerves produces the flow of the gastric fluid; the same happens with the salivary glands, the biliary glands of the liver, the glands of the anodenium, and the pancreas. Several experiments have been made with the udders of cows in milking condition that have been slaughtered, and an examination is recorded of the udder of a cow accidentally killed on the railroad when going home to be milked, when she would have given the usual 10 quarts. The microscope showed the minute lobules of the tissue swollen and distended, but the udder contained practically no milk, except a very small quantity that drained from the divided tissue when cut across. Let us consider what happens when we sit down to milk a cow. The milker gently rubs the udder and gently handles the teats, and this excites the maternal instinct. There is what is called an erectile action of the muscles of the milk organs; the previously soft and loose condition of the teats changes to rigidity, and in a very short time the milk flows, and continues until the glandular tissue is exhausted, when the udder, previously hard and tense, becomes soft and loose. We perceive that this function of the cow is wholly nervous in its action, as indeed every other function of the animal is, and if the due nervous excitement is absent there is no functional action. It is wholly due to the right influence on the nerves that the milk is produced and flows from every ultimate lobule of the udder down through all the ducts, small and great, to the teat. Then, if all goes well, and the cow is in her natural, easily-excited condition, as soon as the milker begins to touch the teats the cow lets down the milk—that is, she does not exert herself to oppose the action of the nerves of the mammary glands. But let the milker be rough or ill-use the cow, or let the cow from any cause be stupid and wilful, and this necessary motherly influence on the nerves be prevented in any way, and there is no milk. The udder may remain as tense and full apparently as usual, but not a drop of milk can be drawn until the current of the cow's mind is turned successfully to the maternal desire.—*Australian Agriculturist.*

To Cure Self-sucking Cows.



Shape a piece of hard wood 8in. long and ¾in. thick, as shown in illustration, the sides being bevelled and the ends pointed. Cut the groove ⅜in. deep. Throw the cow, and when perfectly motionless, pierce the grizzle of the nose with a sharp, narrow-bladed knife and insert the stick. The stick must fit close, or it will not stay, hence the need of making the hole small. Once in, it will not distress the cow. It is generally the best cows that are self-suckers, the habit being due to the extreme pressure of milk causing pain. There are many devices having the same object, but this plan seems to answer very well.—*Australasian.*

Kaffir tribes use a similar device for the same purpose.—EDITOR.

MISCELLANEOUS.

Cultivation of Osiers.

(Revised 1900.)

The Board of Agriculture have extracted the following information relating to the cultivation of Osiers in the Fen districts from a report by one of their Land Division Inspectors who undertook a special inquiry into the subject in the year 1893:—

The term Osier is popularly used as comprehending all the trees or shrubs of the Salix genus which are cultivated as a crop to be con-

verted by the basket-maker and similar craftsmen into various articles which are known as wicker work. The genus Salix includes willows, sallows and osiers. Most of the kinds grown for a crop in the Fen districts are, it is stated, really willows, and not osiers.

Osiers are grown in enclosed plantations, which are locally known as holts. The produce of the osier holt is known commercially as "rods."

Green rods are fresh cut and unpeeled.

Brown rods are those which have been left to dry in their skins.

White rods are those which have had the bark removed or peeled.

Buff rods are produced by boiling brown rods and then peeling them; but the colour thus produced is imitated by dyeing.

In the Fen district osiers are chiefly grown along watercourses, on land which is subject to flooding. A variety of circumstances contribute, perhaps, to this situation being almost universally selected. It is not merely that this is the natural *habitat* of the genus, and that the soil is suitable, but the convenience of having close at hand water carriage for a bulky and heavy crop, which must be for the most part removed in a green state, has no doubt tended to restrict the growth of osiers almost entirely to the neighbourhood of rivers. An additional reason for the selection of such sites is, that the periodical winter floods bring down from the uplands a considerable quantity of soil which acts as a fertiliser. Floods, however, are occasionally the cause of considerable injury to the holts. An ice flood cuts the rods and seriously damages them. Sheet ice settling down on the holt will entirely destroy a crop, and a spring flood which covers the young shoots will kill them; but freshets, which disappear quickly and which do not rise above the tops of the rods, do no harm.

The most suitable soil for the growth of osiers is a deep, rich, moist, alluvial soil. Any good clay may be planted if sufficiently moist. Peat, moor, and hot gravels, are absolutely unsuitable. Though water is requisite, a holt will not thrive in stagnant water.

The site of a holt having been selected, the land must be thoroughly cleaned during the summer before planting, and it may be worth while to give it a complete summer fallow. Before the winter sets in it must be thoroughly stirred either by digging or ploughing to a depth of 14 or 16 inches.

If the soil is not naturally rich, it should be manured, and soot is said to be a good preparation for the crop.

Planting should be done in February or March. The sets are cut from wood of two years' growth—they should be 16 or 18 inches long, and about 10 inches of the set should be in the ground. During the spring and early summer the spaces between the rows must be kept clean by hoeing and forking. The cleaning must be completed before the middle of June, or the osiers will be injured. The cost of cleaning is variously estimated at from £1 to £2 per acre per annum for the first two years. After that time the expense of cleaning is much less, as the dense and rapid growth of the osier stifles and smothers all other vegetation. It may be mentioned in passing that the young

shoots from an established stock will make a growth of 18 inches in the course of a single week.

Under the most favourable circumstances the newly-planted holt will be at maturity after a period of three years, but as a general rule four or five years must elapse before its full development.

A holt properly planted, kept clean, regularly filled up, and well managed will last from 10 to 15 years, the duration depending upon the sorts planted and upon various circumstances which affect the several kinds of osiers in different ways.

The willows and osiers usually grown in the Fen district are known locally by names indicative either of some characteristic of the tree or of the country from which it has come. The favourite sorts are :—

Glibskins.—In some situations this kind is particularly liable to "scab."

Black Mauls.—Small, but hard and tough, and consequently valuable.

Green Sucklings.—A heavy cropper, but not liked by the basket-maker.

Welsh Osier.—This has a very bitter rind, which is disagreeable to all animals ; it is planted on the outsides of holts.

Black Hollanders ; Mottled Spaniards ; Cane Osiers ; and Dutch Red.

Most of these have been botanically determined at the Royal Gardens, Kew. Cuttings of a dozen kinds were obtained from a practical osier grower in Hunts; and it was found that *Glibskins, Black Mauls, Green Sucklings* and *Black Hollanders* were all varieties of *Salix triandra.* The *Welsh Osier* is known botanically as *Salix purpurea,* the *Mottled Spaniard* as *S. decipiens,* and the *Cane Osier* a . *viminalis.*—(*Kew Bulletin,* 1896, p. 143.)

A certain proportion of the coarse-growing osiers may be grown, as the basket-makers require some strong stout rods for uprights; where they are not grown their place is supplied by leaving a portion of the holt to grow for two or three years.

The osiers attain to their full growth by the middle of September. They will make an average growth of 8 or 9 feet, and, occasionally, as much as 13 feet, in a single season.

Cutting the rods commences with the new year, if the holts are accessible. Sometimes, however, floods or other circumstances prevent the early cutting, and the process has to be postponed. It is, however, considered very desirable to cut before the sap rises, as the stocks bleed, and the new growth is less vigorous, if the sap has risen before cutting. The rods are cut with a sharp hook, somewhat like a strong reaping hook ; a clean cut, without splitting the rod, is essentially necessary. As the rods are cut, they are tied up by willow bands into bundles or "bunches." Each bunch has a girth of 45 inches (an English ell) at a distance of 1 foot from the butt end of the bunch. The "ell band" is secured in its place by attachment to another band, called the "breech band," round the butt end. A third band is placed higher up. An average crop will be about 150

bunches per acre, and a heavy crop will reach to 250. A green bunch will weigh 6 stones.

It has already been observed that it is a great advantage if this bulky and heavy crop can be removed by water carriage.

When the rods are to be peeled, they are conveyed to the peeling yard and placed with their butt ends in water, where they remain until the rise of sap makes the peel separate easily from the stick. Sometimes after the rods are cut they will dry from exposure to the air, and in that case they are put in a heap, watered, covered up, and sweated, or "couched" as it is called. If the rods in the pits get too advanced in growth before peeling, the difficulty of peeling is increased, and the rods are damaged. The work of peeling begins as soon as any of the rods are fit. It is chiefly done by women, who draw the rods through a "break" or "cleave." This divides the bark into strips, which are removed by the hand. The children of the peelers assist in this latter operation.

As the rods are peeled, they are sorted into three grades, "large," "Middlesboro," and "small" rods, according to their size and length. They are then exposed to the air for a short time on racks, or reared against hedges or walls. When dry they are tied up in bunches of the same dimensions as before, and stored away in sheds.

Rods which are adapted for the purpose, and which are, in consequence, most valuable, are subjected to another process known as "skeining." This is the longitudinal division of the rod by splitting it into equal parts. The thick end of the rod is nicked with a knife, dividing the circle into three sectiors. A triple wedge is then inserted, and the rod is drawn rapidly through the hand. The split rods are then drawn twice under a knife fixed to a guage to remove the outer ring and inner angle, and the rod is reduced to a flat thin strip of equal thickness. These "skeins" are used for weaving sieve and riddle bottoms, and for making basket handles and similar articles. Green rods are "skeined" by the same process, for making eel grigs, hives, &c.

Hitherto the ordinary practice of most growers has been to sell the rods, when cut, to persons who peel, sort and store them.

Information relating to the cultivation of osiers will also be found in articles by Mr. W. J. Cochrane in the Journal of the Highland and Agricultural Society of Scotland (5th Series, Vol. V., 1893), and by Mr. E. J. Baillie in the Journal of the Royal Agricultural Society of England (3rd Series, Vol. V., 1894); and attention may be directed to their remarks as to the suitability of sewage farms for the growth of osiers.—*Board of Agriculture Leaflet No. 36.*

Green Cut Bone for Poultry.

No article of food has become so universal in recent years with poultrymen as green cut bone. The majority of large poultry keepers who keep hens for winter eggs or who raise broilers or young ducks for market, use green cut bone very largely and consider it indispensable for the greatest profit. It is a highly concentrated food and must be used cautiously. The only danger lies in feeding too much or in feeding that which is sour or mouldy. The one results in forcing the chicks or fowls "off their feed," and in leg troubles, and the other in diarrhœa and bowel complaints. The maximum ration for laying hens is ½ oz. per day.

The use of green cut bone not only increases egg production, but lessens the food cost of eggs. This is very clearly shown by an experiment carried out by the Hatch Experiment Station of Massachusetts a few years ago with two lots of hens and pullets, 19 in each lot, and continuing 79 days from Feb. 9. The food for one lot was in pounds as follows: Whole wheat 99.5, oats 100, wheat bran 18.5, wheat middlings 18.5, Chicago gluten meal 18.5, ground clover 18.5, green cut bone 10, total 283.5, cost $3.25, nutritive ratio 1 to 4.8. The other lot received essentially the same food, except that in place of the green bone it got 9.7 lb. animal meal. The total food was 287 lb., cost $3.26, nutritive ratio 1 to 4.9. The lot receiving green cut bone laid 269 eggs at a cost of .940 lb. dry matter in food per egg and 1.2c. for food consumed, while the other lot laid 145 eggs at a cost of 1.796 lb. dry matter and 2.2c. for food consumed. This included the cost of labour for cutting the bones.

Quite similar results were obtained in more recent experiments by the New York Experiment Station. Here it was found that for laying hens the rations containing animal food proved superior to others in which all the organic matter was derived from vegetable sources. The hens fed green cut bone laid more eggs and at a less cost per egg for food consumed. Pullets raised on food containing considerable bone began laying much earlier than those fed corresponding rations made up of vegetable food. This point is of the greatest importance to poultrymen and farmers, who know of the difficulty of getting late hatched pullets started to laying before cold weather sets in. Once get them laying, and with good food, care and warm quarters they will lay during the late fall and early winter, when eggs are highest, but if they cannot be started before the holidays it is almost impossible to get any profit out of them before every other hen and pullet starts laying toward spring and the price of eggs goes down with a thud.

For raising young chicks and ducks green cut bone as a food has no equal. Nothing will approach it in putting on growth and weight, more particularly with ducklings than with chicks. Ducklings without an abundant supply of animal protein in the ration, together with a liberal proportion of mineral matter, seem unable

to make any approximation to their normally rapid and most profitable growth.

Scrap bone is obtained at markets or packing houses, and the short soft bones with meat adhering to them are preferred. These are ground up in machines made on purpose, which are not expensive. The cut bone may be mixed and fed in the mash, but it is preferable to feed it alone. Fowls and chicks are very fond of it, and it is the best exerciser for them. Scatter it at noon in the straw or litter on the floor and there will be such a scratching for it as you have seldom seen. It is a good practice to feed it three times a week, although a little may be given daily. It should be fed at a regular hour on certain days, for when the hens get accustomed to it they are uneasy unless it is given them at the expected time. The only precautions necessary to observe are, never feed too much, nor any which is tainted.

As an egg forming food, meat and corn are far superior to any other food. A fair comparison between grain and meat will show that ground meat is cheaper than grain because it increases egg production, and contains less waste. The bones supply the albumen, lime, and grit and are less liable to make the hens too fat. One ounce of ground meat and bone may be allowed to each hen every other day in the fall and winter months. Fresh ground bone is superior to any prepared beef scraps.

There is no doubt about the value of bone meal or scraps for promoting the growth of young chicks. It should be fed sparingly at first, and I prefer to feed it mixed with other food, a teacupful, made into a cake, baked brown in the oven. This will answer for 100 chicks 10 days old. Increase the quantity as they grow older. Use judgment, however, as you are liable to throw the young chicks off their feet from overgrowth.—*American Agriculturist.*

Chillies.

The *Queensland Agricultural Journal* has compiled the following useful information on the subject of chillies:—

Why should not Queensland enter upon the production of chillies on a commercial scale? The capsicums grow luxuriantly in all parts of the coast country, and bear fruit almost all the year round. Their cultivation affords far less labour than the cultivation of cereals, sugar-cane, or, indeed, of any other farm crop except Sisal hemp. The plants should be set at a distance of 4 feet in the rows, and from 5 to 6 feet between the rows. They will grow on almost any kind of soil, but prefer a dry, rocky soil with sandy loam, containing some lime. It is difficult to arrive at a correct estimate of the yield of the dried capsicums from a well-grown shrub during the year. Some estimate the annual return at 2lb., others say that 3 lb. and

even 4 lb. may be reckoned on. The selling price of dried chillies in the London market varies from £18 to £34 per ton according to quality—for instance, in April, 1899, fair red Zanzibar sold at 29s. 9d.; good red Japan at 33s. 6d. to 34s. per cwt. The present wholesale price in Brisbane for dried chillies is 1s. per lb., equal to £112 per ton. A sample of capsicums grown in the West Indies, dull and uneven in colour, was valued at 20s. per cwt. What is evidently required is an article bright in colour, even in quality, and possessing great pungency.

The Government Botanist has received a sample of large red, sweet capsicum dried in such a manner that the skin is perfectly transparent and the seeds inside are quite dry, and can be shaken like the dried peas in a "rattle-pod." We have no information as to how the specimen was dried, whether naturally or artificially, but the pod was certainly not opened previous to drying.

A consignment of capsicums prepared in this manner would, no doubt, bring a good price in the English market. Another enticing method of preparing chillies for export is to bottle the long red variety in a solution of salt and water. This preserves the shape and colour of the fruit, and gives it a very attractive appearance.

The Bulletin of the Botanical Department, Jamaica, says on the subject of chillies:—"Pod peppers or capsicums, the fruits of *Capsicum annuum* and allied species, are a well known spice and condiment. They are an indispensable ingredient in curries, and are largely consumed in the fresh and dried state and in pickles. Some forms of capsicum known as Bell peppers are entirely free from the acrid and burning pungency so characteristic of these fruits, and may be eaten cooked as a vegetable or in salads.

Chillies, Bird or Guinea Peppers, the fruit of the shrubby *Capsicum minimum* (usually much smaller than the preceding) grow generally in tropical countries. These are in chief demand in commerce. When thoroughly dried and pounded, and afterwards passed through a handmill and sifted, they are the principal source of the well-known Cayenne pepper.

It is estimated that about 100 tons of dried chillies are annually received into England from the West Indies and the East and West Coasts of Africa."

In the *Kew Bulletin* (1892, p. 88) the following information respecting chillies was given in an article on the agricultural resources of Zanzibar, contributed by Sir John Kirk:—

"The small red peppers, or chillies, are largely grown in the more dry and rocky part of the Island, where the upheaved coal presents a honeycombed surface that favours the accumulation of rich soil in the crevices. The pods are picked when ripe, sun-dried, and packed in neat bags made of the split fronds of the *Hyphæne* palm for shipment. This is an industry that has sprung up within the last thirty years."

Zanzibar chillies, as they appear in the market in a dry state, are small red, thin, carrot-shaped fruits about 1 inch in length.

The following further particulars are contained in a report on the spice and other cultivation of Zanzibar and Pemba (F. O. Report, 1892, Misc. Series, No. 226) :—

"The pepper plant growing in the island is *Capsicum minimum*, usually termed the 'shrubby capsicum,' and producing the bird's-eye chillies forming the basis of cayenne pepper. This is to be found in a small degree in every shamba, but the principal source from which the annual exports are derived is the eastern side of Zanzibar, and the cultivation here is chiefly in the hands of the Wahadinu people.

"Judging from observations made during my brief visit to this portion of the Island, east of Dunga, the chillie cultivation struck me as being of a very scattered nature, generally small isolated patches from half to 1 or 2 acres in extent, and combined with tobacco, tomato, pumpkins, &c. I regret my inability to quote the annual exports, but I believe they are large, and an undoubted source of revenue. As the chillie is, as yet, the only product of any value grown in this less favoured portion of the island, I consider that this cultivation could be extended and that a little fostering care must be productive of much advantage. It is a cultivation easily carried on, and calling for no special trouble or skill, and the returns are certain and profitable. At present the people are so blind to their own interests as to purposely depreciate the value of this product. I understand, through fear of possible shortage by theft on the way down, owners actually damp the chillies before despatching, and it is often necessary, on their reaching the Government Customs godowns, to dry them as quickly as is possible as the only chance of saving them.

"Another variety of pepper (? *Capsicum annuum*), bearing a larger red and yellow pod, is also cultivated, but the produce from this is all consumed locally."

The latest account of Zanzibar chillies is contained in the report of Mr. Consul Cave, on the trade and commerce of Zanzibar, for the year 1897 (Foreign Office, 1898, No. 2129 Annual Series) :—"The production of chillies has risen from 16,336 frasilas in 1896 to 17,698 frasilas in 1897, an increase of 77,670 lb. The average price was 2 dollars 37 cents per frasila, as against 2 dollars 57 cents per frasila during the previous year.* A better price than this could doubtless be obtained for Zanzibar produce if a little more care and attention were devoted to its cultivation and harvesting, but up to the present time it has been allowed to grow almost wild on the coral outcrop which covers the eastern portion of the island, and the slight personal discomfort which attends the handling of pods prevents the native from exercising any care in its picking and subsequent preparation for market. Attempts have lately been made to obtain a better sample on ground which has been specially cleared and prepared for the purpose, but the results are not yet to hand."

*A frasila=35 lb. avoirdupois.

Japanese Chillies.

In a note on Recent Additions to the Museum of the Pharmaceutical Society (*Pharm. Journal*, 11th December, 1897), Mr. E. M. Holmes, F.L.S., furnished the following interesting particulars, at an evening meeting of the Society, respecting Japanese and other chillies :—

"During the last three or four years there has been in commerce a very bright red variety of *Capsicum minimum*, Roxb. (*C. fastigiatum*, Bl.), said to be imported from Japan. In consequence of its clean, bright and attractive appearance, it has commanded a higher price than other varieties. Mr. J. C. Umney has recently directed my attention to the fact that this variety is less pungent than the Sierra Leone and Zanzibar varieties, although far superior to them in colour. On further inquiry I find that this fact is well known to drug and spice brokers. Mr. Umney points out that when an alcoholic tincture of either the Japanese or Zanzibar varieties is diluted with about 14 parts of water, the former gives a much clearer solution than the latter, indicating less oily matter. All the bright red Cayenne pepper until recently in commerce is said to have been imported from Natal in that state. The entire pod pepper imported from Natal is a variety of *Capsicum annuum*, much larger than the chillies, and of a dark red colour and very pungent, whereas the powdered Japanese and Natal Cayenne peppers, placed side by side, are indistinguishable in point of colour. The other principal varieties of chillies at present in English commerce are, I am informed, those of Sierra Leone and Zanzibar, the former being of a yellowish-red tint, and the latter of a dull, dark red, and often of inferior quality, containing badly dried fruits, stalks and foreign matter, but both are more pungent than the Japanese kind. The latter is, however, quite pungent enough for most people, although perhaps unsuitable, by reason of its lesser pungency, for medicinal purposes, as an outward application, &c. I am indebted to Mr. Young, of the firm of Messrs. Dalton & Young, for information concerning the different commercial varieties and for specimens illustrating them. My object in directing attention to these commercial varieties is to point out to students and to retail chemists that there are often differences in the qualities and appearance of the same drug, which are worthy of careful observation, not only from a scientific, but from a commercial point of view. Nepal Cayenne pepper is made from a small variety of *Capsicum annuum*, and is remarkable for its violet odour. Neither this kind nor the Zanzibar gives a red, but a brownish, powder.

The following comments on Mr. Holmes' paper were made at the meeting by Mr. MacEwan :—

"The subject of cayenne pepper was interesting to many chemists quite apart from medicinal purposes, probably more capsicum being sold for feeding birds than for any other purpose. The pepper used in that way was tasteless, and seemed to contain a large amount of fatty matter. It was dark in colour, and the object was to heighten the colour of the feathers. It was supposed to come from

Capsicum annuum, and he should much like to know where it came from. It was only supplied by two or three houses, and attempts by others to obtain it had not been very successful. There was no doubt that the pepper as used was an untreated product. The late Dr. Brady, on his return from Japan, passing through Vienna, came across a comparatively tasteless pepper, which caused considerable discussion at the time, as there was a large amount of it on the market, but the substance had been pretty much lost sight of since. He thought it would well repay enquiry, as very little had been done on the subject of peppers since Dr. Thresh dealt with it about eighteen years ago."

According to a writer in Spons' "Encyclopædia," Div. V., p. 1803:—

"Several varieties of *C. annuum* have little or no pungency; one of these is abundantly grown in Hungary, forming the paprika of the Magyars. Another variety, cultivated in Spain, is imported into this country in powder for giving to canaries, to improve the colour of their feathers. The Nepal capsicums, which have an odour and flavour resembling orris-root, are the most esteemed as a condiment."

CORRESPONDENCE.

White Rot of Grapes.

By to-day's post I am sending you a small box containing a couple of bunches of white Muscatel grapes taken yesterday off a vine in my yard, and which to my surprise I find had within the last few days become from good, healthy-looking grapes to what you will find them, diseased in some way. The vine, which is a comparatively young one, is growing vigorously up against a stone wall and appears to be healthy, and is laden with bunches of grapes, but strange to say that some of the lowest bunches, suspended about nine to ten feet from the ground, have turned and become diseased, the berries becoming brown and dry, and apparently starting from the lowest berries on the bunch. I had the vine sulphurised with some of Brandram's Flowers of Sulphur about three weeks ago, through a sulphur bellows such as is in use about Stellenbosch, where I obtained it. Within the last few weeks we have had a good deal of rain.

As I have about a dozen vines growing on trellises and against walls, different kinds, at present all apparently healthy, I shall be much obliged if you will be good enough to let me know your opinion, or that of some expert, as to the cause of disease in the vine specially mentioned by me.

Thanking you in anticipation. J. Blake.

Burghersdorp, Dec. 28th.

White Rot of Grapes.—I think there can be no doubt that the mischief accruing to the samples of grapes submitted by correspondent is due to the parasitic fungus which causes the White Rot of the American investigators. It is *Coniothyrium diplodiella*, Sac. It occurred first in Italy in 1878, and in 1885 made its appearance in France, when it was studied by Viala and Ravaz. It is now pretty generally spread in Europe.

It will be sufficient to state that the usual procedure with Bordeaux Mixture, sprayed at an early stage upon the young bunches has been found quite efficacious in checking the plague caused by the parasitic fungus. E. P.

Brackish Water. Budding Oranges.

I should be glad if you could inform me if water slightly brak is injurious to trees and plants?

We bored for water and obtained it. It is "sweet brak," as it is called, and we use it for everything excepting coffee and drinking.

Also, I should like to know the right time for budding oranges.—R. Z. E.

"Brak is a general term, and covers a multitude of cases differing greatly one from the other. Of course it means that the water contains certain salts dissolved in it. These for the most part, are sodium sulphate or Glauber's salt, magnesium sulphate or Epsom salt (Engelsche zout), sodium chloride or common table salt, and magnesium chloride. Obviously these are saline purgatives to the animal system, and it is their presence, along with carbonic acid gas generally, which gives the medicinal value to the celebrated springs of Aachen, Seidlitz, Kissingen, Homburg, and others, to which invalids flock as to a modern Bethsaida. Now the possibility of using a Cape brak water for drinking, for irrigation, or for watering cattle, clearly depends upon the amount of its saline contents per gallon. If there be but a trace of the aforementioned salts, little or no harm is done. If it be greater, possibly custom may habituate the drinkers to the laxative effect of the salts, but strangers using the water for the first time will be affected. And with vegetable life things are much the same. Some crops will bear a little salty flavour in irrigation water, particularly beetroot, turnip, cabbages and asparagus. Others, and by far the larger series, are impatient of a brakness which is only just perceptible to the taste. Unless a sample of the water be analyzed, it is impossible to give any definite reply further than the above, and actual trial alone can determine how far such water can be turned to account. This is risky, for a garden patch might easily be spoiled by one year's use of a brak-water. Analysis is the safest course all round.—P.M.O.

The latter end of October and November are the best months for correspondent's district.—E.P,

Interspace Crops in Orchards.

F.H.—I have done all in my power to discourage the unreasonable practice of trying to get crops off the spaces intermediate between fruit trees, and thus robbing the main object of the plantation for the sake of a little surreptitious profit out of cabbage and cauliflower rows. It is like taking the children's bread from them and giving it to the dogs, or rather selling it while the owners go hungry. Suppose the vine-growers were to do the same thing between the rows of their vines, would they be considered sane? See,—here is a little bit very much to the purpose from the report of the Woburn Experimental Fruit Farm now being run in the interest of the orchard industry by the Duke of Bedford. For "grass" read orchard snatch crops, and you have the proved facts as they apply to your case.

"The effect of growing grass around the young trees is one of the most striking of our results. The grass-grown trees, after five years growth, are scarcely bigger than when planted, and their actual increase in weight during that period is about eighteen times smaller than that of similar trees grown on tilled ground. We believe the main causes of this effect to be the large increase in the evaporation from the soil brought about by the grass, causing the trees to suffer from drought,—the deprivation of other nourishment passing into the grass instead of into the trees, and also the prevention of a normal access of air to the roots."

It is not as if you grew lupines or rape between the tree rows, and ploughed the crop in. That would be *giving*. What you propose to do is *taking* from the trees. Condescend in this matter to be wise by the experience of others, instead of buying wisdom at the cost of personal trial and loss.—P.M.O.

Protection of Young Fruit from Frost.

I notice in the *Journal* of the 25th October a report of early fruit being destroyed by frost. As perhaps my experience of means used for fruit protection may be useful, I will describe my plan. Some time ago, whilst living on the farm Groot Haasfontein, where there are three orchards within one thousand yards of each other, we had a late frost. Feeling what was coming during the night, I had heaps of rubbish collected all about my orchard. On rising very early the following morning I found all the standing water frozen over. I then lit the heaps of rubbish and kept the trees in a dense cloud of smoke till after sunrise. The owner of No. 2 orchard started his smoke at sunrise, and No. 3 orchard was not smoked at all.

The results were: the frost did no harm to the fruit in my orchard, in orchard No. 2 there was a little fruit, and in No. 3 there was none at all.

Last year we had again a severe late frost, which pretty well cleared the Tarka district of fruit. I have two small orchards on my farm, the better of which I smoked and the other was neglected. The result was the same as before—in the smoked orchard no damage done, in the other all the fruit destroyed. I would suggest where orchards are on highly situated farms and there may probably be a late frost, that heaps of kraal manure be placed all over them, that they may be ready to be set alight when it is felt there will be a frost at midnight, or at least 1 a.m.

I don't pretend to know what effect the smoke has on the frost, but all I know is it will save the fruit.*

SAMUEL J. JAKINS.

Valentine, Dec. 12th.

* Mr. Jakins will find the whole thing explained in this Journal so long ago as Dec., 1892, in vol. v. p. 253. It is an ancient practice all over the European vine area.—ED.

Tattooing Ostriches.

In your issue No. 12, vol. xvii., of December last, there is a query *in re* "Tattooing Ostriches."

We have imported an instrument for use in marking ostriches by tattooing them on the upper part of the thigh. It is a tattoo stamp much in the form of a post office obliterating stamp, the cost of stamp and ink, any brand, being, delivered to our clients, between £1 and £1 5s. These brands are made by Messrs. W. Willis & Co., Melbourne, Australia, for whom we are agents in South Africa.

We are continually getting out sheep ear marks, cattle ear marks, cattle brands, patent ear labels, etc., for our clients. Messrs. Willis & Co. make every description of iron, steel and brass brands and stamps.

GREEN & CO.

16, Lombard Chambers, Port Elizabeth, Dec. 22nd.

Unfruitful Vines.

Kindly advise me what to do in regard to my vineyard, which appears to be unfruitful.

The stocks are principally Crystal and Barbarossa. They are 5 years old and stand 6 feet apart on all sides. I usually prune them somewhat late - not until all the shoots have appeared—after which they are watered, the ground is dug over and raked. Then they get no water again until in January with the same treatment.

The growth is good yet they bear no fruit.

If you can give me any information how to go to work I shall be thankful.

P. J. NESER.

Poortjesfontein, Hanover, 27th November, 1900.

Though the unfruitfulness of vines may be due to many causes, I have almost no hesitation in ascribing the non-bearing in this particular instance to wrong pruning.

The fruit of the vine is borne on shoots resulting from the development of buds situated on a shoot of the previous year, which in its turn grows off or stands on two-year-old wood. Any green shoot not fulfilling these conditions will, in most cases, bear no fruit at all. As, however, there is every reason to assume that Mr. Neser has adopted the ordinary system of pruning commonly practised in the Colony, a selection of the wrong wood cannot be responsible, and I feel inclined to ascribe the want of fertility to the practice of pruning short.

All the buds on a one-year-old shoot growing off two-year-old wood are not equally serviceable, and will not give rise to equally prolific shoots. Whilst some such buds will give shoots with upwards of three branches, others will produce shoots with only one and others again with no branch at all. It is therefore important to know the position of the fertile and that of the infertile buds to be able to prune judiciously and effectively. Now the position of such buds varies with the kind of vine, hence a modification of pruning must be applied according to the vine under cultivation.

With weak-growing vines, or vines of medium strength, almost all the buds, particularly those at the base and middle parts of the shoots, are fertile, whereas on strong, vigorous growing vines, the first few buds at the base of such shoots are sterile. Hence ordinary pruning to a spur of two eyes is not applicable in such instances, as it would result in the destruction of all fertile buds, leaving the infertile ones at the base.

Crystal Grapes and Barbarossa are both strong growing varieties and therefore not adapted to the ordinary system of cultivation or pruning, and I would advise Mr. Neser to apply the system of rod-pruning.

To practise rod-pruning without disadvantage to the shape of his vines, Mr. Neser must utilise the two shoots formed from the spur left at the last season's pruning. The top shoot should be left long—from 6 to 10 buds—whilst the lower shoot is cut back to two eyes. The former will then bear, and the latter will produce shoots for next year's pruning, then the long shoot is entirely removed after bearing and the two shoots from the lower spur are again pruned as afore described, and the same principle is applied year after year. To avoid the necessity of supplying supports, it is well to apply this system alternately to two arms standing opposite each other, and twist the long bearers so that they form an arch above the stem of the vine.

I would also advise Mr. Neser to prune in future when his vines are still dormant, and not wait, as he states in his letter, until the shoots have all appeared.

Stellenbosch, December 12th. C. MAYER.

GOVERNMENT NOTICES.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal suffering is from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Lung-Sickness.

NTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....
Owner's name and address } ....
In charge of..
Place to which Cattle are being sent..
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(*Endorsement to be made by the Inspector.*)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.
(Inspector's Signature..
(Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle } ....
Owner's name and address } ....
In charge of..
Place to which Cattle are being sent..
(Inspector's signature)..
(Address)..
Date....................

Notice to Fruit-growers.

The Board of Horticulture, having deputed Mr. P. J. Cillie to visit during this season the Western Fruit Districts, with a view to framing a list of varieties suitable for cultivation in the different parts, hereby invite the assistance and co-operation of fruit-growers by affording Mr. Cillie every facility and supplying him with the desired information.

C. Mayer, Acting Secretary.

Medeah Seed Wheat.

The attention of wheat-growers is drawn to a small consignment of Medeah Seed Wheat (the balance of a quantity ordered in 1897) which has just been received from Europe and is now available for experimental sowing.

Our readers may be reminded that, as more fully set forth in the statement published in the *Agricultural Journal* (No. 4 Vol. XI. of 17th August, 1899), the result of 27 trial sowings of this wheat, distributed over 23 districts, shows that it has good rust-resisting qualities. In 13 cases there were no signs of rust, in 4 there was but a slight touch, and in 9 the amount was small and did not appreciably affect the yield and the wheat compared favourably with other varieties sown in the same locality. The yield varied from 250 lb. to 2,188 lb.,—the average being 1,134 lb. for every 100 lb. sown.

Further reports which have been received, regarding a few trial sowings in 1899, show the same rust-resisting qualities. Of 6 trial sowings, no rust appeared in 5, the sixth having been killed by drought; and the yield averaged about 1,400 lb. for every 130 lb. sown.

Albert, Barkly East, Wodehouse, Bedford, Tarka, Humansdorp, Robertson, Caledon, Vryburg and Xalanga Districts gave the best returns.

The wheat will be distributed, for experimental sowing, under the following conditions:—Not more than 100 lb. to any one person; the recipient must pay a deposit at the rate af 10s. per 100 lb., which deposit will be refunded to him upon his furnishing a full report, upon a printed form to be supplied by the Agricultural Department, regarding the growth, mode of cultivation and yield of the seed sown.

COST OF RAILWAY OR OTHER TRANSPORT FROM CAPE TOWN MUST BE PAID BY THE APPLICANT.

As the quantity available for distribution is limited, applications must be sent in not later than 31st December, 1900, and addressed to the Under Secretary for Agriculture, Grave Street, Cape Town.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Show Fixtures.

*Elliot Agricultural Society, April 10th, 1901.
Indwe Native Agricultural Society, March 1901
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.
Western Province, Rosebank, 21st and 22nd February, 1901.

* The Elliot Agricultural Society has decided not to hold any Show this year.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		4 18 0	to	5 0 0
LINSEED CAKES.				
London made	per ton ex mill	8 10 0	,,	8 12 6
American, in bags	ex dock	7 15 0	,,	7 17 6
Russian, in bags	,,	7 17 6	,,	8 0 0
COTTONSEED CAKES.				
London made	ex mill	5 0 0	,,	5 2 6
Egyptian, in bags	ex dock	4 15 0	,,	4 17 6
,, ,,	Nov.-April shipment	4 15 0	,,	4 17 6
Decorticated	Oct.-Nov. ,,	6 17 6	,,	7 0 0
Meal, on spot	,, ,, ,,	6 12 6	,,	6 15 0
RAPE CAKES.				
East Indian Seed	ex mill	4 15 0	,	—
Nutted, in bags	,,	4 15 0	,,	
MAIZE.				
Germ Meal (American)	ex dock	5 7 6	,,	5 10 0
Germ Meal (English)	ex mill	5 8 9	,,	5 10 0
RICE MEAL.				
Rangoon	ex warehouse	4 12 6	,,	4 15 0
,, Jan.-March	ex ship	4 7 6	,,	—
MANURES.				
Nitrate of Soda				8 10 0
Bone Meal				4 10 0
Superphosphate 36°				3 0 0
Basic Slag, 38°				1 18 0
Kainit 23°				2 10 0

Mark Lane Express, Dec. 3rd, 1900.

AMERICAN PRICES.

	£ s. d.
Bran, per ton of 2,000 lb.	3 12 5
Linseed Cake ,,	5 16 0
Cottonseed Meal ,,	5 7 6
Mealies, per bushel 60 lb.	0 2 0
Barley ,, 50 lb.	0 2 1
MANURES—	
Ground Bones, per ton of 2,000 lb	3 15 0
Kainit ,, ,,	2 0 0
Florida Rock (Phosphate)	2 1 8
Nitrate of Soda, per 100 lb.	0 8 6

New York Journal of Commerce, Nov. 26th, 1900

RAINFALL, NOVEMBER, 1900.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory (*a*) 12 inch gauge	0·84
Do. (*b*) 8 inch gauge	
Do. (*c*) 8 inch gauge on roof	
Cape Town, Fire Station	0·76
Do. South African College	0·90
Do. Molteno Reservoir	0·92
Do. Platteklip	1·14
Do. Signal Hill	0·53
Table Mountain, Disa Head	1·62
Do. Kasteel's Poort	2·74
Do. Waai Kopje	2·68
Do. St. Michael's	3·34
Devil's Peak, Block House	n.r.
Do. Nursery Gauge	n.r.
Do. Lower Gauge	n.r.
Rondebosch	1·92
Newlands (Montebello)	1·85
Bishop's Court	1.09
Claremont	n.r.
Do. (Oaklands)	n.r.
Kenilworth	0·80
Wynberg (St. Alban's)	0·59
Do. (St. Mary's)	0·62
Groot Constantia	n.r.
Tokai	0·85
Simon's Town (Wood)	0·93
Do. (Gaol)	1·09
Blaauwberg Strand	0·66
Robben Island	0·46
Strandfontein	0·46
Camp's Bay	0·18
Mouille Point	
Fish Hoek	n.r.
Durbanville	n.r.
Smith's Farm	1·10
Sea Point	0·58
Cape Point	0·58

II. SOUTH-WEST:	INCHES.
Langebaan (Saldanha Bay)	
Eerste River	n.r.
Klapmuts	0·90
Stellenbosch (Gaol)	0·81
Somerset West	0·59
Paarl	1·33
Wellington (Gaol)	1·43
Do. (Huguenot Seminary)	1·44
Groot Drakenstein	0·82
Tulbagh	1·62
Kluitjes Kraal	n.r.
Houw Hoek	n.r.
Ceres	1·95
Rocklands	2·75
Caledon	0·86
Caledon (Gordon)	
Worcester (Gaol)	0·82
Do. (Meiring)	n.r.
Hex River	0·56
Lady Grey (Div. Robertson)	0·25
Robertson	0·90
Do. Govt. Plantation	0·57
Ashton	n.r.
Montagu	1·05
De Hoop (Div. Robertson)	0·63
Ceres Road	0·94
Worcester	0·72
Karnmelks River	1·04
The Oaks	n.r.
Weltevreden	1·40
Goudini	1·69

III. WEST COAST:	INCHES.
Port Nolloth	0·04
Do. (Howard)	n.r.
Klipfontein	0·36
Kraaifontein	0·21
O'okiep	0·30
Springbokfontein (Gaol)	0·54
Concordia	0·27
Garies	n.r.
Kersefontein	0·56
The Towers	0·57
Dassen Island	n.r.
Malmesbury	0·58
Piquetberg	0·83
Van Rhynsdorp	0·13
Clanwilliam (Gaol)	0·70
Do. (Seydell)	0·81
Welbedacht	n.r.
Hopefield	0·61
Lilyfontein	0·90
Zoutpan	0·51

IV. SOUTH COAST:	INCHES.
Cape L'Agulhas	0·46
Bredasdorp	0·80
Swellendam	2·75
Heidelberg	0·98
Riversdale	0·76
Herbertsdale	n.r.
Geelbeks Vlei	0·72
Mossel Bay	0·37
George	2·21
Ezelzagt	n.r.
Millwood	2·77
Sour Flats	1·63
Concordia	2·12
Knysna	2·16
Buffels Nek	2·87
Harkerville	1·60

IV. SOUTH COAST:—*continued.*

	INCHES.
Plettenberg Baai	1·67
Forest Hall	2·03
Blaauwkrantz	2·56
Storm's River	1·63
Witte Els Bosch	2·83
Humansdorp	1·93
Cape St. Francis	3·19
Hankey	0·40
Witteklip	1·85
Van Staadens (upper)	1·70
Do. (lower)	1·74
Uitenhage	0·31
Do. (Inggs)	0·26
Dunbrody	0·71
Port Elizabeth (Harbour)	0·89
Walmer Heights (near Port Elizabeth)	2·23
Tankatara	0·27
Lottering	1·72
Shark's River (Nursery)	n.r.
Do (Convict Station)	1 88
Grootvader's Bosch	1·66
Zuurbraak	2·75
Armadale	0 33
Victoria Park	1·03
Vogel Vlei	0·34
Great Brak River	1·03

V. SOUTHERN KARROO:

Touws River (Station)	0·64
Ladismith	n.r.
Amalienstein	0·44
Calitzdorp	0·00
Oudtshoorn	0·96
Vlakte Plaats	n.r.
Uniondale	0·27
Kleinpoort	0·09
Glenconnor	0·50
Pietermeintjes	0·22
Triangle	0·38
Verkeerde Vlei	1·20
Bok River	0·80
Touws River	0·64

VI. WEST CENTRAL KARROO:

Matjesfontein	0·15
Prince Albert Road	0·12
Fraserburg Road	0·00
Prince Albert	0 23
Zwartberg Pass	2·52
Beaufort West	0·03
Dunedin	0·00
Nel's Poort	0·00
Camfer's Kraal	0·00
Lower Nel's Poort	0·00
Baaken's Rug	0·00
Willowmore	0·15
Steytlerville	0·00
Roosplaats	n.r.

VII. EAST CENTRAL KARROO:

Aberdeen (Gaol)	0·00
Do. (Bedford)	0·00
Aberdeen Road	0·00

VII. E. C. KARROO:—*continued.*

	INCHES.
Rietfontein	0·08
Winterhoek	n.r.
Klipdrift, De Erf	n.r.
Kendrew	0·15
Graaff-Reinet	0·39
Do. (College)	0·50
New Bethesda	n.r.
Roode Bloem	0·00
Wellwood	n r.
Do. Mountain	n.r.
Jansenville	0·00
Patrysfontein	0·00
Toegedacht	0·23
Klipfontein	0 16
Cranemere	0·42
Pearston	0·32
Walsingham	0·43
Somerset East	0 85
Do. (College)	0·82
Longhope	0·50
Middleton	n.r.
Corndale (Div. Aberdeen)	0·00
Cookhouse	0·10
Doornbosch, Zwagershoek	0·35
Middlewater	0 57
Darlington	0.24
Bloemhof	0·00
Arundale	0 29
Graaff-Reinet	0.67
Klipplaat	n.r.
Kendrew (Edwards)	n.r.
Glenharry	0·13
Bethesda Road	0·03

VIII. NORTHERN KARROO:

Calvinia	0·20
Middlepost	0·06
Sutherland	0·33
Rheboksfontein	n.r.
Fraserburg	0·00
Onderste Doorns	n.r.
Droogefontein	0·00
Gannapan	0 00
Carnarvon	0 00
Wagenaar's Kraal	n.r.
Brakfontein	n.r.
Vogelstruisfontein	n.r.
Victoria West	0·42
Britstown	0·35
Murraysburg	0·37
De Kruis	0·14
Richmond	0·18
De Aar..	0·43
Middlemount	n.r.
Hanover	0·00
Philip's Town	0·04
Boschfontein	0·07
Petrusville	0·00
The Willows	n.r.
Naauwpoort	n.r.
Middelburg	0·00
Colesberg	0·09
Tafelberg Hall.	n r.
Rietbu t (Colesberg Bridge)	0·12

VIII. N. KARROO—*continued.*	INCHES.
Stonehills	0·00
Cradock	0·06
Do. (Rose)	0·07
Varsch Vlei	0·00
Witmoss	0·59
Steynsburg	0·23
Do. (Nesemann)	n.r.
Daggaboer's Nek	0·85
Springfield	
Quagga's Kerk	n.r.
Tarkastad	0·17
Drummond Park	0·50
Riet Vlei	0·44
Brand Vlei	n.r.
Williston	
Omdraai's Vlei	0·27
Zwagersfontein	0·00
Varken's Kop	0·10
Culmstock	n r.
Doorskuilen	0 09
Houwater Dam	0·14
Hillmoor	0·15
Glen Roy	0·28
Fish River	0·45
Spitzkop	n.r.
Phizantefontein	0·00
Biesjesdam	0 00
Groot Vley (Theebus)	n.r.
Kleinhaasfontein	0·00
Spring Valley	0·00
Haasfontein	0·00
IX. NORTHERN BORDER:	
Pella	0·00
Kenhardt	0·00
Van Wyk's Vlei	0·00
Prieska	n.r.
Dunmurry	1·06
Griqua Town	0 85
Campbell	1·15
Douglas	0·83
Avoca (Herbert)	0·81
Eskdale	0·90
Hope Town	0·73
Orange River	n.r.
Newlands (Div. Barkly West)	1 21
Groot Boetsap	1 69
Kimberley (Gaol)	0·39
Do. (Harrison)	0·57
Beaconsfield	
Bellsbank (Div. Barkly West)	1·74
Grootdrink	n.r.
Barkly West	0·92
Upington	0·42
Trooilapspan	n.r.
Keimoes	1 28
Anenous	0·32
The Halt	0·16
Karree Kloof	0·55
X. SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	
Fairholt	0·43
Cheviot Fells (Bedford)	0·31

X. SOUTH-EAST: *continued.*	INCHES.
Alicedale	0 20
Bedford (Gaol)	0·74
Do. (Hall)	n.r.
Sydney's Hope	0·70
Cullendale	0·63
Adelaide	0·40
Atherstone	0·58
Alexandria	0·75
Salem	0·53
Graham's Town (Gaol)	0·90
Do. (Bact. Inst.)	0·83
Heatherton Towers (near Graham's Town)	0·84
Fort Beaufort	0·16
Katberg	n.r.
Balfour	0·97
Seymour	1·09
Glencairn	0·76
Alice	0·42
Lovedale	n.r.
Port Alfred	0.75
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	0·74
Cathcart	0·18
Keiskama Hoek	0·68
Dynamite	0·00
Thomas River	n.r.
King William's Town	1·18
Do. Hospital	1 49
Stutterheim (Wylde)	0·92
Do. (Beste)	n.r.
Dohne	0·98
Kubusie	n.r.
Blaney	n.r.
Kei Road	n r.
Evelyn Valley	n r.
Berlin	n r.
Isidenge	n.r.
Pirie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	n.r.
Komgha	1·10
Prospect Farm (Div. Komgha)	1·38
Hopewell Do.	
East London, West	n r.
East London, East	5.35
Fountain Head	0·57
Fort Cunynghame	
Katberg Sanatorium	1·57
Cuylerville	0·89
Bolo	0 48
Fort Fordyce	n.r.
Exwell	0·25
Melrose	0 90
Sunnyside	0 87
Chiselhurst	0·43
XI. NORTH-EAST:	
Venterstad	0·14
Ellesmere	0·06
Burnley, Cyphergat	n r.
Burghersdorp	0·17

XI. NORTH-EAST—*continued.*

	INCHES.
Burghersdorp (Le Roex)	0·08
Molteno Station	0 00
Cyphergat	0.00
Thibet Park	0·15
Sterkstroom	0·15
Sterkstroom (Giddy)	0·33
Rocklands	n.r.
Aliwal North (Gaol)	0 00
Aliwal North (Brown)	0.17
Rietfontein	0·19
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	0·15
Jamestown	0·0[illegible]
Queenstown (Gaol)	0·20
Queenstown (Beswick)	0·22
Dordrecht	0·66
Tylden	n.r.
Snow Hill	n.r.
Herschel	0·15
Lady Grey	0·43
Bolotwa, Contest	0·04
Lady Frere	0·21
Avoca (Div. Barkly East)	n.r.
Keilands	0·19
Barkly East	0·19
Glenlyon	0·99
Gateshead	0·75
Lyndene	n.r.
Mooifontein	n.r.
Poplar Grove	0·10
Biesjesfontein	n.r.
Whittlesea	0·34
Blikana	0·54
Doornkop	0·64
Table Hill	0·00

XII. KAFFRARIA:

Slaate, Xalanga	0 26
Ida, Xalanga	0 30
Cala, Xalanga	0·00
Cofimvaba	0·47
Nqamakwe	0·69
Main	0·33
Engcobo	0·66
Butterworth	1·11
Kentani	1·40
Maclear	0·63
Idutywa	0·76
Willowvale	2·87
Mount Fletcher	0·81
Elliotdale	n.r.
Mqanduli	0·00
Matatiele	n.r.
Umtata	1·22
Qumbu	0·71

XII. KAFFRARIA—*continued.*

	INCHES.
Kokstad	0·88
Port St. John's	n.r.
Umzimkulu	2·11
Woodcliff	n.r.
Tabankulu	n.r.
Kilrush	2·11
Somerville (Div. Tsolo)	0·81
Tsomo	0·33
Setcba	1·54
Flagstaff	2·15
Sneezewood	1·01

XIII. BASUTOLAND:

Mafeteng	0·45
Mohalie's Hoek	0·63
Qacha's Nek	0·86
Moyeni Quthing	0·45
Teyateyaneng	1·50
Leribe	n.r.
Butha Buthe	3·46
Maseru	2·04

XIV. ORANGE RIVER COLONY:

Jacobsdal	n.r.
Philippolis	n.r.
Bethulie	0·21
Jagersfontein	n.r.
Bloemfontein	n.r.
Smithfield	0·00
Wepener	n.r.
Kroonstad	n.r.
Fauresmith	n.r.
Frankfort	n.r.
Ladybrand	n.r.

XV. NATAL:

Durban, Observatory	4·52

XVI. TRANSVAAL:

Johannesburg	n.r.
Do. Cemetery	n.r.
Doornfontein	n.r.
Bremersdorp, Swaziland	n.r.

XVII. BECHUANALAND

Vryburg	n.r.
Maritzani	n.r.
Mafeking	n.r.
Taungs	n.r.
Doornbult	n.r.
Morokwen	n.r.

XVIII. RHODESIA:

Salisbury	8·43
Hope Fountain	5·46
Geelong	n.r.

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AGRICULTURE.

Reports and Prospects.

Bizana, *Dec. 13th.*—Light rains have fallen during the month and there is plenty of grass for stock. There has not, however, been sufficient rain for agricultural purposes. A few swarms of locusts have appeared in the district, but owing to crops being late this season, they have not been able to do much damage. A European was employed during the month to distribute locust fungus with good results. Stock of all kinds doing well. [B. E. COTTERELL, A.R.M.

Elliot, *Nov. 30th.*—The drought still continues. The little rain we had last month revived the grass for the time being and live stock improved; but now the veld is dried up, and in many places there is no water for stock. As to crops, there are none worth speaking of in any part of the district. Notwithstanding drought, sheep, cattle and other stock are healthy.

J. P. Cumming, R.M.

Engcobo, *Dec. 5th.*—Severe drought has prevented any cultivation in the district for the last six months, and myriads of locusts which have visited us, have demolished all the pasturage. The Natives in this district are in a semi-state of starvation, and mealies are realising two pounds per muid sack at the different stores. To-day copious rains have fallen, and although late, a fair harvest may be expected, as mealies may be planted up to the end of the current month.

J. G. Leary, R.M.

Flagstaff, *Nov. 30th.*—The rainfall of 2 inches of the past month was partial. Ploughing operations have been continued in those parts favoured with rain, but in other parts very little or no cultivation has been done. The pasturage, too, is very dry in some localities, especially in the deeper valleys of the chief rivers, though no change has been noticeable in the general condition of stock. Two outbreaks of lungsickness were reported and the necessary steps have been taken to quarantine the areas affected.

J. F. Rein, R.M.

Fort Beaufort, *Jan. 5th.*—Last month the rainfall was 5.77 inches. More fell in other parts of the division and the country is in grand condition, crops looking as well as they can. Stock are healthy and improving in condition; farmers suffered losses in their flocks, in parts somewhat heavily. The rains at the beginning of the month put one in mind of old times, dams full and water running everywhere.

B. Booth.

Humansdorp, *Jan 5th.*—The drought from which this and neighbouring districts had been suffering for some months previous, and which threatened the total destruction of crops on all dry lands, was finally broken up by a fine and general rainfall which, commencing on the 3rd, continued off and on up to the 23rd December. The total rainfall registered here for the month was 4·85 inches, of which 1·76 fell from the 3rd to the 6th inclusive, and 2·61 from the 17th to the 20th inclusive. The yield of oathay for this season will probably be less than that for last, as also of wheat and barley, but the crops have been remarkably free from rust, and the quality of all, oathay especially, is much superior to that of last season's crops. The Egyptian oat appears to have been largely sown and has answered admirably. I have seen some splendid samples of it now coming into the market. There is every prospect of a fine mealie and pumpkin harvest. Several new steam irrigation plants have been set up along

the Gamtoos River during the past year, and fresh ground placed under cultivation, so that with fair weather and absence of insect plagues, there is every prospect of an abnormally heavy crop of mealies from that fertile valley. With the exception of oranges, the fruit crop will probably be a failure owing to the severest winter cold having, for the third time in succession, visited the country in Spring. With the exception of the ever-present heart-water and lamziekte, there have been no diseases of stock reported during the past month. The outbreak of red-water which occurred in the South-eastern part of the Tzitzikama ward in September last has been finally stamped out, and the district appears now to be entirely free from glanders. There have been no incursions of locusts up to the time of writing.

C. W. ANDREWS, C.C.

Idutywa, *Dec. 6th.*—There has been very little rain during the past month. Both small and large stock have been rapidly falling off in condition and great numbers have been driven towards the coast for pasturage. Happily during the past three days two inches of rain have fallen, and this gives some hope that the terrible drought is over. The Natives have about three weeks in which to plough and sow mealies.

F. BELL, R.M.

Kokstad, *Jan. 3rd.*—The agricultural outlook has greatly improved during the past month. Plenty of rain has fallen and the grass and young crops are in excellent condition. Stock of all kinds are doing well, although it is regretted that lungsickness has made its appearance in the district. The locusts seem to have quite disappeared.

W. LEARY, A.R.M.

Libode, *Dec. 1st.*—I have very little of importance to report upon for the past month. A little rain fell in the district towards the end of last month, but not sufficient to be of any material benefit to growing crops or veld. Natives are in a very poor and almost destitute state in this district, and as some little time must elapse before the present crops will be fit to be harvested, it is hard to surmise how they will manage to exist during that period. Large swarms of locusts have been destroyed in the district during the past month, and if only they could be kept free from this intolerable pest, Natives might be able to anticipate splendid crops. The veld is looking fairly well, though more rain would greatly benefit it. All kinds of stock are at present looking in good condition and there is no disease of any kind amongst them. Mealies are decidedly scarce just now and are fetching from 35s. to 40s. per bag.

J. C. GARNER, R.M.

Maclear, *Dec. 31st.*—There is nothing special to report. Heavy rains have fallen during the month and pasturage is excellent, and the fruit crop promises well this season. Stock are healthy and in very good condition. Locusts are still doing damage to the standing crops. Fungus has been used but no successful results have been

reported. A large caterpillar has made its appearance in the district and is doing considerable damage to the trees; large trees being entirely denuded of leaves. H. BONN, R.M.

Matatiele, *Jan. 3rd.*—Grand rains have fallen throughout the district during the past month. Pasturage is now improving and stock picking up. No cases of lungsickness have been reported during December. R. CUMMING, A.R.M.

Middelburg.—A correspondent in the division writes:—"A succession of six years' drought, severe frosts, and at the last stage of destruction, a living mass of locusts for the last nine months eating every blade of food, and when stock were brought so low many farmers lost large numbers from starvation. In addition, a cold rain lasting about fifteen hours, measuring here 4.30 inches, and in the mountains where the rivers take their rise, nearly six inches, caused losses all round which have been something terrible. In some instances whole flocks were swept away, and in one case a whole flock were drowned in their kraal on the bank of the river, the water rising so high as to envelop kraal and sheep. Some masonry dams in rivers were completely swept away, and many others damaged. Outside dams were broken and fences in all directions damaged and washed away. Some lucerne fields were swept away, while others were so completely silted up that they will be killed. The last flood was colder and the rainfall heavier than in 1874. Also in December, after a long and severe drought, the rain lasted without intermission eight days and nights. Unfortunately, I had no gauge, but the volume of water must have been enormous. The damage in 1874 was much greater." And now in addition to above accumulated troubles and ruinous losses the war has degenerated into a system of brigandage with its violence and robbery which causes anxiety, loss and disturbance over large areas of the Colony.—EDITOR.

Mount Ayliff, *Dec. 31st.*—Rains have fallen, and the Natives have been busy ploughing and sowing their lands. The pasturage is now very good, and stock are thriving. There is no contagious disease among animals in the district. A few locusts have passed through, but they have not done much damage. R. HARRIES, R.M.

Mount Fletcher, *Jan. 5th.*—5·14 inches of rain fell during the month. The Natives have been in consequence able to plough. The crops are backward. Cattle, horses and small stock are improving. Locusts are still in the district, but have done very little damage. Veld is in splendid condition. H. TILLARD, A.R.M.

Mount Frere, *Jan. 5th.*—The agricultural outlook has improved since my last report. Copious rains fell during the past month, and the veld consequently is in grand condition, and ploughing has been carried on in all parts of the district. A few locusts were scattered

about in the district at the beginning of the month but these have been destroyed in various ways. One case of lungsickness was reported, which was promptly placed under quarantine, and the cattle infected are better and will shortly, I hope, be released. Small-pox broke out during October last and has spread over about a third of the district, but, owing to prompt measures being taken in quarantining and vaccination, the disease has to a certain extent been checked. All stock are in good condition.

H. GARNER, A.R.M.

Mqanduli, *Nov. 30th.*—There is nothing to report. Rain is badly wanted, and although a good lot of land has been ploughed up there is much left on account of drought. Mealies are a few inches high in some parts but rain is required to save them. The veld is very good and so are stock of all kinds. Locusts have been destroyed in great numbers, indeed I do not now know that there are any throughout the district. The Natives have but little grain, and unless they reap a good harvest, the starvation already near will be most serious. L. FARRANT, R.M.

Ngqeleni, *Dec. 5th.*—Towards the latter part of last month a few nice showers of rain fell, thus enabling crops to grow. Stock still maintain all that can be desired in condition and pasturage is excellent. J. W. MORRIS, R.M.

Nqamakwe, *Dec. 1st.*—No rain worth speaking of fell during last month, and so no ploughing has been done, while the crops sown in September have either perished through drought or been devoured by locusts. If rain does not come within the next two or three weeks it will be too late for planting mealies, and the outlook for Natives will be most serious. Attempts have been made by them in every part of the district to destroy locusts, but without much success. Owing to the long drought, water and grass are very scarce, and all kinds of stock are in poor condition. C. J. WARNER, R.M.

Peddie, *Jan. 5th.*—Fine rains have fallen and both veld and crops are looking exceedingly well. Stock of all kinds are healthy and in good condition. A. W. PRESTON, A.C.C.

Qumbu, *Dec. 31.*—Since the date of my last report the country has undergone quite a transformation Then, we were suffering from a most terrible drought, with no prospect of rain, and the outlook was most gloomy. Now, wherever the eye casts its vision it is met with the most pleasing verdure. Copious rains began to fall early in the month and have continued up to date with intervening days of fine weather. Ploughing was at once resorted to with vigour by the people so much that more lands were brought under the plough than for some years past. In the high lying parts of the district some of the crops may not all ripen if early frosts should set in, but in the greater half a good harvest may be expected provided the crops escape destruction by locusts and seasonable

summer rains continue. A case of lungsickness appeared at a kraal in the vicinity of the magistracy, but the beast was slaughtered by the owner and there have been no fresh outbreaks. The usual precautionary steps under the Animals Diseases Act were of course taken. A. REIN, R.M.

Tsolo, *Jan. 4th.*—The long-looked-for rain came about the 7th ultimo, and since then seasonable showers have fallen and the veld and crops are looking well. The rainfall for the month was over 5 inches. Stock of all kinds are improving in condition fast, and ploughing was commenced early in the month. There is a prospect of a good grain season if locusts keep off.
J. SIMPSON, R.M.

Tsomo, *Nov. 30th.*—The rainfall registered at this station during the month was .033 in. Locusts have now got wings, and have all disappeared in the direction of coast districts. Stock are still in low condition. No cases of lungsickness have been reported during the month. The month was a very trying one, and Natives on the whole have done very little ploughing, owing to the fact that their cattle are in such poor condition. W. THOMSON, R.M.

Umzimkulu, *Dec. 31st.*—The unseasonably dry weather which has prevailed has hindered the timely planting of cereal crops to a great extent all over the district, indeed in the lower portion ploughing is not yet completed. Fortunately rains fell the week before last, in time to permit of the plough being used and seed planted before it was too late. In the upper portion of the district, where, owing to early frosts, it is imperative that mealies and Kaffir corn should be put in early, the recent dry weather has worked havoc, necessitating in many instances a second sowing. It is impossible at present to attempt to forecast the yield of the season's crops as there are so many probabilities to regard at this early stage. Stock are in good condition and free from disease of an infectious or contagious nature. The only area in the district which was in quarantine on account of lungsickness is now freed from the restrictions in that respect, the disease having ceased to exist amongst the cattle in that area. A large number of horses for remount purposes were bought by Army Officers in the district during the month for which satisfactory prices were obtained by owners. E. J. WHINDUS, R.M.

Uniondale, *Jan. 7th.*—Farmers are now reaping, and an average fair crop is expected; rain is, however, badly needed to bring on mealie and bean crops. Locusts have made their appearance in the northern part of the district, and I have strongly urged farmers to club together to exterminate them, but it is doubtful whether they will attempt to do so, until too late. Stock are in good condition and no diseases have been reported.
C. SCHOLTZ, C.C.

Van Rhynsdorp, *Jan. 4th.*—For years past farmers in the district have not gathered so good and abundant a harvest as the last one proved to be, although the late crops were destroyed by rust, which disease was also the cause of the partial failure of the oat crop. The prospects of several farmers in and around this village of a good vintage were shattered in one night by a severe frost from the effects of which fruit trees also suffered considerably. Both large and small stock are doing fairly well according to the season. They are healthy and there is abundance of dry grazing; the prospects, therefore, of stock farmers at present are bright. C. BAM, C.C.

Victoria East, *Jan. 10th.*—Since my last communication the district has been blessed with most welcome rains, some 6·96 inches having fallen during the month. The country in consequence is looking like a flower garden, and the grass is waving into seed. Ploughing is going on in every direction. The young standing crops, mealies, &c., are growing to perfection and a good season is anticipated. The heavy rains did much damage to lands adjacent to the rivers, not only with regard to the loss of seed, but the ground in many places was washed away down to the bed-rock. Stock are all doing well and fast improving in condition, little or no sickness reported. The much dreaded locust has disappeared from our midst, much to the delight of the agriculturist and gardener. R. FERRIS, C.C.

Willowvale, *Nov. 30th*—Up to the present the district is still free from locusts, and unless they arrive in the winged state later on, the prospect of young crops is promising. Natives have taken advantage of recent rains by putting every acre of arable land under cultivation. The veld is in splendid condition, and with the exception of a few cases of horse-sickness, stock are in healthy condition. M. W. LIEFELDT, R.M.

Wodehouse, *Jan. 1st.*—About 100 swarms of young locusts have been destroyed by soap and sheep, and the farmers are enthusiastic on the subject. Stock have improved since the rains. I hope that a quantity of lucerne will be sown this month. A growing interest in fruit culture is being stimulated. C. J. LEVEY, C.C.

The Principles of Tillage.

A lecture on Tillage was delivered recently by Dr. Howell (of the Victorian Department of Agriculture) at Nhill, and the following extracts are taken from the report in the Melbourne *Leader*:—

"Tillage," said the lecturer, "was a word covering a number of operations in agricultural procedure—ploughing, digging, sub-soiling, trenching, harrowing, &c.—in fact, all operations designed for the improvement of the soil. The preparation of the seed bed, and making it into a favourable condition for the growing crop, was included in the term. Draining and liming were also designed for the improvement of the soil, and might, therefore, be considered as closely connected operations. As all these operations were carried on for the improvement of the soil, its nature and constitution should first be investigated. We were apt to look upon the soil as an uninteresting mass of dead matter, but it must be remembered that it held nearly every element from which we ourselves, and all life, had to draw the materials for being and sustenance. The substances contained in plant life were identical with those of which the soil was composed. It would therefore follow that the soil must form the breeding ground of the plant. While all the substances were not essential for the growth of a plant, a large number were absolutely necessary. When one of the substances was wanting in the soil complete plant growth would not follow, and productivity depended on the form in which they were present. The lecturer showed by diagram the enormous amount of root produced by plants under a favourable mode of tillage. All tillage operations ought to be designed for such improvements in the soil as would make it adapted to the growth of plant life. Soil should have looseness of texture, and a certain degree of moisture and temperature. An American experiment proved that an acre of red clover absorbed 452 tons of water, equal to four inches of rain. Attention was directed to the differences of root plants on soil with a good tilth, and stiff, compact clay land. On the one hand there was a beautiful symmetrical expansion, while the roots on the other were in a twisted tangle.

Referring to ploughs and their improvement, the lecturer said that the English plough did only two things—inverted a flat furrow and made it straight. The true object of the ploughing was not the turning over of the ground alone, but its pulverisation. The modern American plough was designed for this purpose. The long narrow mould-board was superseded by one bold, short and overhanging. This modern plough assisted materially in the production of a favourable condition of the ground. To produce the finely worked condition of the soil or tilth, other operations had to follow—the harrows, cultivator and roller had to finish what the plough began. The size of the soil particles had an enormous influence on the extent of surface the soil presented, and the lecturer proved by diagram that a cubic inch of soil reduced a thousand times

possessed an internal surface area equal to one acre. This showed how necessary was the pulverisation of the soil, as it increased to such an enormous extent the feeding area of the roots of plants. There were certain soils which, when brought to a fine tilth, ran together and puddled with the winter rains, but the remedy for this lay in altering their texture. The use of lime was very good for the treatment of such soils. Light soils of a loose, porous nature did not require deep ploughing. In these ploughing should always take place at the same depth in order to form a hard bed, and to assist capillarity or the rise of water to the surface. These lands were improved by working a little on the wet side.

The subject of subsoil ploughing deserved far more consideration than had yet been given to it in the colony. The lecturer quoted results from a farm near Edinburgh, where subsoiling had been adopted, from which it was shown that ploughing to 8 inches produced 20 tons of turnips as against 26.7 tons on land that had been subsoiled 18 inches. A subsoiler could easily be made by removing the mould-board from an old plough, which would follow in the track of another plough going ahead. There was also an implement on the market which combined the two operations. Trenching and subsoiling were identical. By turning up and stirring 8 or 9 inches with the plough instead of 4 the root development was naturally doubled. When the roots spread over double as much soil their chance of finding moisture to feed the plant was increased. The deep ploughing also allowed root development at a depth which enabled them to escape the effects of the dry weather. There were other conditions that should be considered, viz., aeration, temperature and moisture. These were also controlled to a considerable extent by the depth to which the soil was stirred. Exposure to the sweetening influences of the atmosphere had a very good effect on the soil. Hence the solution of the theory that the few inches on the top of the land formed a more genial home for the young roots than that at a lower depth.

A great thing to be guarded against in the soil was evaporation. It was advisable to conserve the moisture in every way possible, and that could be done by deep ploughing, which severed the capillary tubes. Besides, it was self-evident that where there were only about 4 inches of soil, with a hard subsoil, the evaporation would be greater than if there were 8 or 9 inches. The deep ploughing, therefore, helped to conserve the moisture. That was worthy of consideration, for in a colony like Victoria, where the rainfall was limited, every possible means for preserving the moisture of the soil should be brought to bear. The greatest source of loss of moisture was evaporation, and therefore it should be guarded against. Drainage was necessary on some soils, but it would not do on others. The nature of the soil should be considered before draining was attempted. In soils of a loose, porous nature draining was not necessary, even with a heavy rainfall. It was certainly not easy to understand, but drainage increased the supply of moisture in the

soil, for owing to the loose texture of a drained soil, all the moisture that fell was sucked up as in a sponge, and did not lie about in pools on the surface till evaporated, but was in a measure absorbed by the subsoil beneath the drained portion, and held there until brought to the surface by capillary attraction.

Dr. Howell also urged on his audience the necessity of manuring, but added that it was no good without the soil was properly prepared for it, which could only be done by a system of good tillage."

Fertilisers for Wheat.

In a report of the Agricultural Experiment Station of the State College of Kentucky, we find the appended interesting and suggestive account of the application of several kinds and combinations of manures for wheat. One prominent result of these trials is to show the special value of phosphatic manures. As our colonial soils are over large areas of our arable lands but poorly supplied with phosphates, there is little doubt that these new manures cannot fail to be beneficial.

In order that the tabulated statement may be more readily understood, we have changed the dollars and cents into shillings and pence. The bushel is rated at 60lb. or 3½ bushels to our colonial muid.

"Mr. E. G. Austin, of Prentiss, Ohio Co., continued his experiments with fertilizers on land similar in character to that on which his former experiments were made, the results confirming the conclusion already reached that phosphates are needed upon the soil of that vicinity (coal measures). The application of acid phosphate produced a profitable increase in the yield of wheat, while the use of nitrate of soda or potash salts, either separately or in connection with phosphates, produced but little effect. The results reported by Mr. Austin are given in the following table, the yield being calculated in bushels of 60 pounds and its value at 60 cents a bushel. The cost of the fertilizer per acre is calculated at £9 7s. 6d. per ton for nitrate of soda, £3 6s. 8d. for acid phosphate, £9 7s. 6d. for muriate of potash and £6 5s. 0d. per ton for bone meal.

RESULTS OBTAINED WITH FERTILIZERS

Number of Plot.	FERTILIZER USED AND RATE PER ACRE.	Yield of Wheat Bu. per Acre.	Value of Wheat at 60c per bu. s.	d.	Cost of Fertilizer per Acre. s.	d.	Value of Wheat less cost of Fertilizer. s.	d.
1	None	3⅓	8	4	0	0	8	4
2	Nitrate of Soda, 160 lb.	3½	8	9	15	0	6	3*
3	Acid Phosphate, 320 lb.	15⅓	38	4	10	10	27	6
4	Muriate of Potash, 160 lb.	2 5-6	7	1	15	0	7	0*
5	None	3 1-6	7	8	0	0	7	0
6	Nitrate of Soda, 160 lb. / Acid Phosphate, 320 lb.	15	37	6	25	10	11	8
7	Nitrate of Soda, 160 lb. / Muriate of Potash, 160 lb.	3 5-6	9	7	30	0	20	5*
8	Acid Phosphate, 320 lb. / Muriate of Potash, 160 lb.	14½	36	3	25	10	10	5
9	Nitrate of Soda, 160 lb. / Acid Phosphate, 320 lb. / Muriate of Potash, 160 lb.	17½	43	9	40	10	2	11
10	Bone Meal, 300 lb.	15½	30	9	18	9	20	0

Mr. Austin's wheat was sown October 21st with a disc drill and the fertilizer was sown the next day by hand, great care being taken to get it evenly distributed. The wheat was up well on the plots within 10 days after sowing, and no difference was observed between the plots until the last of November, when plots 3, 6, 8, 9 and 10 began to show a better colour and a much ranker growth than the others, and this difference continued to increase until harvest time. Plots 1, 2, 4, 5 and 7 made but little growth of straw and very short, poorly filled heads of inferior wheat.

The results obtained by Mr. Austin in the past three seasons should be valuable to the farmers of Ohio county and to many others whose lands are situated upon the coal measures formation, both in Eastern and Western Kentucky. The experiments were made each year upon a different piece of ground, but always upon land of the same character and, Mr. Austin says, fairly representive of the land in that part of the State.

* Less than cost of Fertilizer.

Mr. Austin's Results for Three Seasons.

Number of Plot.	Fertilizer Used each Season and Rate per Acre.	Yield of Wheat per Acre in Bushels of 60 lb. 1897-8	1898-9	1899-1900	Average.
1	None	3.9	6⅔	3⅓	4.6
2	Nitrate of Soda, 160 lb.	9 4	10 5-6	3½	7.9
3	Acid Phosphate, 320 lb.	15.3	11½	15⅓	14.0
4	Muriate of Potash, 160 lb.	6.4	8 5-6	2 5-6	6.0
5	None	7.6	7	3⅛	5.9
6	Nitrate of Soda, 160 lb. Acid Phosphate, 320 lb.	19.6	15 1-6	15	16.6
7	Nitrate of Soda, 160 lbs. Muriate of Potash, 160 lb.	8.3	11⅓	3 5-6	7.8
8	Acid Phosphate, 320 lb. Muriate of Potash, 160 lb. .. .	16.2	14½	14½	15.4
9	Nitrate of Soda, 160 lb. Acid Phosphate, 320 lb. Muriate of Potash, 160 lb.	20.7	12	17½	16.7
10	None	8.1	10 1-6	..	9.1
11	Floats, 400 lb.	..	10½	..	..
12	Bone Meal, 160 and 300 lb.	..	10⅓	15½	12.9

The figures show clearly the considerable increase resulting from the use of phosphates. They show also a slight but very evident increase from the use of nitrate of soda, which, while not enough to pay for the nitrate used, may be considered as indicating that these soils might be further improved by growing cow peas or clover upon hem to increase the vegetable matter or humus they contain."

STOCK FARMING.

Angoras in Australia.

It appears (says the *Queenslander*) that after many years of failure, the breeding of the Angora goat is to be a success in Australia. As the Australian climate is said to be much akin to that of Asia Minor, the home of the Angora, the want of success hitherto in acclimatising the animals has been not a little perplexing to those who attempted it in South Australia. But it seems that Mr. E. A. Scammell, who has a station on the Murray, about thirty miles from Blanchetown, has solved the problem as to which is the class of country best suited to the Angora goat. Despite adverse seasons the herd has had to contend against, it has increased most satisfactorily. Whether it be the river pasturage, climate, or attention that is responsible, the fact remains that the animals have thriven as they never did in Australia before. The fleeces, too, according to report, are superior to what has previously been obtained in Australia, whilst the animals have improved both in size and appearance. The goats on Mr. Scammell's station are shorn every nine months; the average weight of wool per goat is about 5 lb., and the price obtained ranges for the unwashed article at from 18d. to 2s. per lb. The animals can be shorn the first year. In South Africa the breeding of the Angora goat has proved most lucrative, and according to recent statistics there are something over 2,000,000 of the animals there now. In America, too, great advances are being made in the breeding of the Angora goat, and inquiries have quite recently been made by foreign buyers in Australia for pure-bred animals, which are stated to be rapidly increasing in value.

Calf Rearing.

An experiment has been carried out at one of the American agricultural stations on the feeding of calves. In this experiment four calves were selected, two of them being fed upon whole milk and the other two upon skim milk enriched with flaxseed. The flaxseed, it may be noted, was boiled into a jelly before being added to the skim milk, and as much of it was used as the calves could assimilate without conducing to too lax a condition of the bowels. The experiment lasted for a period of three months, and the results clearly showed that the combination of skim milk and ground flaxseed, when judiciously fed, bore very favourable comparison

with new milk as a ration for young calves. Among other things it was found that the skim milk and flaxseed meal calves were less affected in their growth by weaning than those which were given whole milk. Some idea of the economy effected by the substitution of the flaxseed for the butter-fat in the whole milk may be gathered from the fact that the gain in butter-fat for each of the calves amounted to about 5s. per head per month. *Live—Stock Journal.*

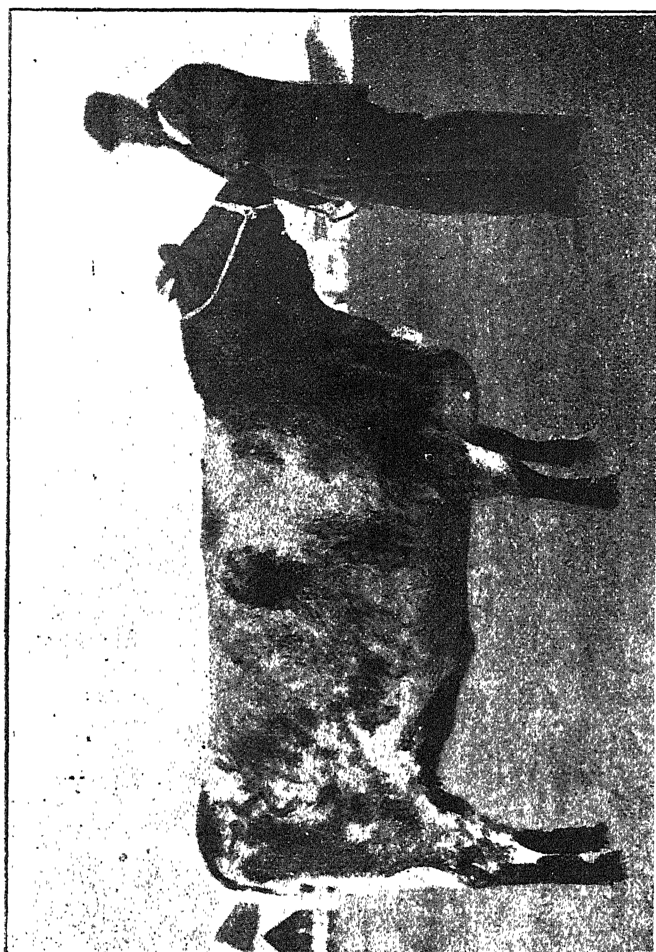
Improvement of Milch Cows.

A most instructive illustration of the advantage to be derived from "breeding with a purpose" is afforded by the milk records of the herd of dairy cows kept in connection with the famous Cornell University in the United States. Starting, close on thirty years ago, with a herd of about twenty cows, which were only capable of producing an average of about 300 gallons of milk in the year, an effort was made to so cross and select these animals and their progeny as to improve their milk-producing capacities from year to year. A beginning was made by using bulls of well-known milking strains, and little by little the milking capabilities of the cows were steadily improved until at the present time the record of the twenty odd cows kept in the herd (all of them descendants of the original twenty which only averaged 300 gallons of milk) works out to close on 800 gallons per annum! All this was accomplished by the combined results of crossing with bulls of good milking strains, and the careful selection for breeding purposes of animals whose dams had specially distinguished themselves as milkers. What has been done here is capable of achievement by every farmer who lays his mind down to that end and operates accordingly. Instead of selling off the calves produced by their best milker, they should make a special point of retaining these in their own herds and mating them with purchased bulls of a good milking strain. Working upon these lines the milk records of nine out of every ten herds in the country could be improved by hundreds of gallons annually.—*Live Stock Journal.*

Shorthorn Beef Cattle.

This heifer won the champion prize in the late Birminghan Fat Stock Show, is the property of Her Majesty the Queen, and was adjudged to be the best animal on view.

The *Mark Lane Express* says:—"The champion of the show has had a successful career. The age of the animal is 2yrs. 9m., and it was bred by Her Majesty on the Prince Consort's Shaw Farm,



SHORTHORN HEIFER, CICELY.

Windsor. As a yearling at the Royal Agricultural Show the animal took first prize, and was adjudged champion of the show. She was also champion at the Highland Society's Show at Edinburgh last year, and took first prize and the championship at the Royal County Show at Winchester last summer. Cicely will be exhibited at the Smithfield Show, which commences on December 10th. She at present turns the scales at 16cwt. 1qr., or 1,810 lb. live weight."

Besides the championship, there were several other prizes awarded to this heifer. We have before referred to the two branches of the shorthorn breed, those more especially famous as beef cattle, and the others as valuable for the dairy, an illustration of which sort is given in No. 13, vol. xvii., and it will be well for anyone importing shorthorns to obtain those most suitable for their purpose.—EDITOR.

VETERINARY.

Quarter-ill, Black-leg, Sponsziekte, or Chabert's Disease.

Is what is termed a specific contagious disease, that is, a disease which manifests certain constant characters, runs a definite course, and owes its origin to a distinct micro-organism, or disease germ. The micro-organism which is constantly found in the diseased tissues and to which the disease is attributed is a rod-shaped bacillus, similar to, but nevertheless distinct from the anthrax bacillus; in appearance, it is stouter, and rounded at its extremities, and has other distinctions. For instance, the anthrax bacillus requires oxygen for the manifestation of its vital phonomena, whereas oxygen arrests the vital action of the bacillus of quarter-ill; again, when viewed under the microscope, the anthrax bacillus is motionless, while the quarter-ill bacillus exhibits free movement.

Further, the anthrax bacillus grows and multiplies in the blood of its victim principally, whereas the quarter-ill bacillus is rarely found in the blood, but is found chiefly in the cellular tissues and muscles of the affected part. "In the serous fluid between the *fibrillæ* of the muscle, and in the subcutaneous cellular tissue there are large numbers of bacilli; these may also be found in cover glass preparations made from the liver and spleen, but rarely in the blood vessels and capillaries, except the post-mortem examination has been delayed until some time after death. Inoculation with the organs or the serous fluid from the tumours causes the same or similar phenomena and a fatal result in calves, sheep, goats, rabbits and

guinea-pigs; horses, asses and white rats are but little susceptible; swine, dogs, cats, ordinary rats and fowls are completely immune."—(Flügge.)

It affects young cattle more particularly ranging from six months to four years old, the greatest percentage of victims being under two years of age. There is a growing opinion, however, that the immunity of older animals in districts where the disease is prevalent is gradually acquired by repeated mild inoculations. If old animals are brought from a district where the disease is unknown and exposed to infection where the disease is prevalent, they are said to be liable to contract it. Sheep are very susceptible to infection when the virus is introduced by direct inoculation, but as it is through wounds or abrasions of the skin principally that the spores of the disease enter the system, the fleece of the sheep acts as a protection.

Symptoms.—The onset of the disease is sudden, the affected animal appears dull, ceases to feed and ruminate, and shows a disinclination to move about, the breathing becomes quickened, and the temperature is high. When the characteristic tumour occurs in a fore or hind-quarter, which it does most frequently, the animal is observed to be stiff or lame, and frequently lies down; an examination will generally reveal an irregular swelling under the skin on the affected limb or quarter. This swelling is painful to the touch in the early stage, but as it extends—which it does very rapidly—it becomes emphysematous and insensitive, the animal evincing no pain when it is pressed in the centre, and when tapped with the fingers it emits a crepitating or crackling sound, like air in a dry bladder. By the time that this stage is reached the animal will be down, showing no disposition to rise; indications of depression and prostration rapidly increase, the animal remaining in a dazed, semi-conscious condition until it dies, often without a struggle. In some cases there is trembling of the muscles, and convulsive movements immediately before death, which generally occurs 36 to 48 hours after the first appearance of the symptoms. The temperature rises very high at the onset of the disease, and falls considerably below normal some time before death ensues. Death is due to the effects of toxic substances generated by the bacilli in extra vascular positions, and absorbed into the blood. As already remarked, the characteristic swelling appears most frequently in one of the fore or hind-quarters, hence its English designation of "Quarter-evil." The swelling may, however, appear on the back, loins, or on either side, but in whatever situation it arises, it presents the same characters—irregular in shape with undefined borders, and crepitates or crackles when manipulated with the fingers.

Post-mortem appearances.—The carcase generally swells rapidly, and a dark coloured frothy discharge flows from the nostrils and anus. The skin over the swelling has a dry parchment feel, and on cutting into the tumour, a collection of gas will be found in the cellular tissue said to consist chiefly of carbonic acid and methane.

The muscles and cellular tissue of the affected part are soaked with a large quantity of sero-sanguinous fluid and the surface of the muscles is of a black colour, shading off towards the edges and becoming brighter by contact with the air. The tissues of the tumour emit a sour smell, resembling rancid butter. The lymphatic glands in the neighbourhood of the part are markedly congested. The blood in blackquarter always forms a good firm clot, and the spleen is normal in size and appearance, in striking contrast to anthrax. There are no characteristic alterations in the internal organs.

Preventives.—The only preventives of Quarter-evil are a complete change of pasture, and inoculation. Even if it is impracticable to remove the susceptible cattle to another farm, a change to a different part of the same farm, accompanied by a change of kraal as well, will often arrest the further spread of the disease. Care should, however, be exercised not to remove any affected animal along with the herd, as that would tend to spread the infection. If it is impossible to arrange for a complete change of pasture, no time should be lost in getting all the young stock inoculated.

Previous to the discovery of inoculation by Arloing, Cornevin and Thomas, a considerable number of preventive remedies for this disease were practised by stock farmers, and even by the Native tribes. Reasoning from the fact that young stock which are rapidly improving in condition are the most susceptible to an attack of the disease, a large number of these preventive remedies took the form of measures for lowering the condition of the animal and reducing the richness of its blood, such as bleeding, purging, driving the animals violently for considerable distances, or swimming them through a river or large dam daily, turning them on to poor pasture, or in other ways reducing their allowance of food. "Want of exercise causes an accumulation of lactic acid in the muscles, this favours the germination of the spores." (Salmon.) Inserting a peg or seton in the dewlap is a preventive upon which great reliance is placed. In what manner this seton exercises its beneficial effects has never been properly explained. Many are of opinion that it is the means of introducing septic organisms which have an antagonistic action to the organisms of Quarter-evil. Be that as it may, a firm belief in the efficacy of setoning as a preventive of Quarter-evil was world-wide, and many still believe in its efficacy, notwithstanding that it has completely failed to justify that opinion when submitted to an experimental test.

Others again placed great reliance on the introduction of certain medicinal or antidotal agents into the system of the animals to ward off the disease. The following amongst a host of others were largely used: the sulphite and hypo-sulphite of soda, and carbolic acid and its compounds. One writer pins his faith to madder, while another has equal confidence in saltpetre. There are many who believe in the efficacy of a lick made up of common salt, sulphur, copperas, lime and saltpetre, while others again pin their faith to the adminis-

tration of Stockholm tar. Garlic is another remedy which is largely used in this Colony, not only as a preventive of sponsziekte, but of the majority of the specific diseases of stock, such as Rinderpest, Horse-sickness, &c. There are various methods of using the garlic. Some make a small pocket under the skin in the dewlap, and insert one or two of the bulblets in there, while others insert them into similar pockets under the skin in various parts of the body. Oil of garlic, like oil of mustard, is a germicide; it is also very volatile, permeating the whole system in addition to setting up severe local irritation. It is just possible, therefore, that garlic and some of the other popular remedies may exercise some preventive effect against Quarter-evil for a limited time. It is probable, however, that many of these popular remedies have established their reputation as preventives of the disease from the fact that, during certain years when the remedy has been resorted to, the disease did not occur, the local or general conditions not being favourable; and on other occasions it has ceased to spread owing to the presence of natural causes, concurrent with the application of a certain remedy, but few—if any—of these popular preventive remedies have stood the test of continued experience.

Quarter-evil exhibits certain peculiarities in respect to the manner in which it may appear, and disappear, amongst cattle on a farm. The disease sometimes appears with great virulence on a farm during one year, and it may then skip one to two years before it reappears. Further, cattle may have been grazing for six, nine, or twelve months on certain pastures without a single case of the disease occurring, when it will appear suddenly, attacking the young stock in rapid succession. The cattle are then removed to another locality and the disease suddenly ceases. After an absence of one, two, or three months these cattle are brought back to the infected veld, and in the great majority of cases, with perfect impunity, no more cases occurring perhaps for many months. These facts indicate that there are certain local conditions which favour, or otherwise, the development of this disease, in addition to the presence of the spores in the soil. It is also very probable that the beneficial effect of the change upon the cattle themselves renders them less susceptible to the action of the spores of the disease when they return to the tainted pasture. MM. E. Leclainche and H. Vallée give a very clear explanation respecting the manner in which these influences favour or hinder the development of Quarter-evil. The conclusions arrived at by these savants are supported by a series of carefully conducted experiments; for a description of these see *The Journal of Comparative Pathology and Therapeutics*, vol. xiii., parts 2 and 3. They say Quarter-evil is a disease in which the infection comes from the soil, causing disease only in certain conditions of susceptibility, and due to a sporulating organism. It is probable that the spore derived from the soil does not reach the body charged with toxin, and spores without toxin do not kill. The phagocytes—or living cells which are present in all healthy tissues and whose main function is to absorb and destroy disease

organisms—triumph rapidly over spores that have been deprived of their toxin. But if the spores are protected against the phagocytes by the properties of the toxin, the spores germinate at the place where they have been introduced, and infection takes place. The addition to the spores of lactic acid, acetic acid, potassium lactate, and the application of some simple traumatic injury will produce the same effect as the toxin, in preventing the action of the phagocytes on the spores. Spores that may safely be given in millions will kill with a dose ten times smaller, if one drop of lactic acid is added. The harmlessness of the spore by itself is not due to any attenuation of its virulence produced by heating or other means which deprives it of its toxin, this is shown by the fact that the addition of a certain quantity of toxin or lactic acid restores its virulence, and the pure spore then kills as rapidly as the fresh culture from which it was taken. This is clearly shown by the fact that if the spores are protected by purely mechanical means such as coagulated albumen from the destroying action of the phagocytes, they have time to germinate, and the evolution of the disease is only slightly retarded.

The occurrence of diverse forms of bacteria in the tumours of the disease also exerts an action that is sometimes favouring and sometimes hindering to the development of the disease.

Every influence, therefore, which is capable of diminishing the vitality of the tissues and hindering the action of the phagocytes will facilitate the development of the spores, and permit them to manifest their virulence; and *per contra*, every influence which tends to increase the vitality of the tissues and thereby favours the activity of the phagocytes, will have a tendency to prevent the development of the disease.

If, however, we admit the influence of all these local conditions which under certain circumstances favour or hinder the development of Quarter-evil, are we justified in totally ignoring the temporary effects of many of the popular preventive remedies, which are artificially applied, because we cannot explain how they act?

Hygienic Measures.

The carcase should not be skinned or cut up, but buried whole, and any blood or excreta should also be placed in the grave. The place where the carcase lay, and the grave itself, should be well saturated with a ten per cent. solution of carbolic acid, Jeyes' fluid, or the carbolic sheep dips. Corrosive sublimate is one of the most effective and cheapest disinfectants, made of the strength of 1 pt. to 1,000 pts. of water.

Heat is the most effective agent for destroying the vitality of the spores of Quarter-evil, hence burning should be resorted to where fuel is abundant.

If the carcase requires to be removed some distance to the place of cremation or burial, it should not be dragged along the ground, but placed on a sleigh or bushes, the latter should then be burned.

Putrefaction has apparently little effect on the organism of Quarter-evil. Its tenacity of life depends upon its power to form spores, these constitute a dormant form of the micro-organism, which possesses a very high degree of resistance to all destructive agents, but which under ordinary circumstances outside the animal body are unable to multiply. Hence it is very difficult to eradicate from a pasture, some pastures being more subject to it than others; "fermentation in the soil tends to form lactic acid, and this favours the germination of the spores." (Salmon.) Burning the pasture, and thus depositing a layer of ashes, would tend to neutralise that.

Preventive Inoculation.

MM. Arloing, Cornevin and Thomas in 1884 discovered a method of protective vaccination against Quarter-evil. They prepare their vaccine from the virulent juice taken from the tumours of infected animals; the liquid when dried at 37° Cent. gives a brown powder containing the virulent spores. One part of the powder is mixed with two parts of water, and the mixture, spread in a thin layer, is placed in the stove. The first vaccine is obtained by heating it for seven hours at 100° to 104° Cent., and the second is heated for the same time at 90° to 94° Cent. From the foregoing description it will be observed that the action of the heat profoundly modifies the toxin, but exercises little or no action on the spore. The residue is composed of brown scales of albumen enclosing the spores. Trituration of this material yields the powders which are sent out in quantities of ten doses, either enclosed in small bottles or enveloped in paper.

Directions for using Black Quarter or Sponsziekte Vaccine.

Two vaccines are employed, viz, 1st and 2nd.
The 1st vaccine is put up in the tubes *without* a black ring.
The 2nd " " " " *with* "
Each tube contains vaccine for at least 10 animals.
An interval of 8 to 10 days ought to be allowed between the 1st and 2nd vaccination.

The apparatus necessary for the operation is:—

(1) A small mortar and pestle.
(2) A graduated hypodermic syringe, with a capacity of 10 cc. The needle of the syringe ought to be almost as thick as an ordinary knitting needle, and have a proportional bore.

Mixing of the vaccine.—Immerse the mortar and pestle for 10 minutes in water near the boiling point; have at hand a quantity of water recently boiled and allowed to cool. Rinse out the syringe first with 5°/$_0$ carbolic solution (in water), and then two or three times with boiled water.

Drain the mortar and pestle dry, and then turn into the former the contents of one of the small tubes (1st vaccine for 10 animals). Fill the syringe (10 cc.) with boiled (and now cold) water. Eject a few drops of this into the mortar, and triturate the powder with it, so as

to form an uniform paste. Continue the rubbing, and gradually add the whole of the water in the syringe. When the powder has thus been uniformly mixed with the water suck the whole back into the syringe.

The Operation.—Clip the hair from the under surface of the tail for about six inches extending upwards from the tip. Wash the part thoroughly with a 5 per cent. solution of carbolic acid in water. Then gently shake the syringe so as to mix the vaccine contained in it, and insert the hypodermic needle under the skin on the under surface of the tail, entering it on the middle line about 3 inches above the tip, and push it vertically upwards immediately under the skin for about 3 inches; move the needle a little from side to side so as to enlarge the channel at its upper end—then withdraw it a little, and inject one-tenth of the contents of the syringe (=1 cc.). Withdraw the needle and syringe together, at the same time press firmly on the puncture in the skin, and gently rub the swelling containing the vaccine so as to spread it out in the cellular tissue. The dose mentioned (1 cc., or 18 drops) is sufficient for an animal over one year old; for calves of six months the dose is 12 drops, and for 9 months, 15 drops.

The Second Vaccination is carried out after 8 or 10 days in the same manner, the vaccine being injected under the skin of the tail immediately above the seat of the first operation. After all the animals of one lot have been operated on, the syringe ought to be rinsed out with 5 per cent. carbolic solution. The operation ought not to be performed when the weather is very hot or very cold.

Every care is taken in the preparation of the vaccine, but no guarantee is given regarding its safety or efficiency.

Treatment.—The curative treatment of this disease after the symptoms have manifested themselves, has rarely been found effective, although certain remedies have been highly spoken of by some for a limited time. The general method of treatment adopted has been to cut through the skin over the whole extent of the swelling, and then to separate it from the diseased tissues underneath, as far as can be done without acute pain to the animal—that is, to the borders of the healthy tissues surrounding the dead and diseased swelling; the serous fluid is then squeezed out of the swollen part, after which such substances as common salt, sulphate of copper, carbolic acid, garlic, &c., are rubbed into the part. This external treatment is combined with the internal administration of large doses of ammonia, common salt, saltpetre, carbolic, &c., while the affected animal should be kept constantly moving. Many so-called cures have been effected by such means, but speaking generally, a reliable cure, or a moderately successful method of treating Sponsziekte, has not yet been discovered.

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HORTICULTURE.

Strawberry Culture.

The following article on Strawberry Culture, by Mr. A. Despeissis, is taken over, with some omissions, from the Journal of the Department of Agriculture of Western Australia:—

Classification of the Strawberry.

The modern cultivated strawberries are derived from four prototypes, two of European and two of American sources. Those improved varieties are, however, widely different from their originators, but they, nevertheless, retain certain characteristics which are essentially their own. By means of hybridisation or pollination, many of the choicest berries have issued, and which combine some of the most prominent features it is sought to develop.

The two European species are: *Fragaria vesca* (so called from the fragrant fruit), the wild Wood strawberry, of which the "Queen of Four Seasons" is one of the most prolific and best variety. Unlike those larger fruited strawberries, the result of artificial cultivation, the wild Wood strawberries are easily propagated from seeds, the seedlings bearing as a rule a constant resemblance to the parent plant. This species deserves more attention at the hands of growers, on account of its hardiness and its more protracted bearing season. The berries were originally small, round, and light of colour, but by means of careful selection, more elongated, larger and better coloured varieties have resulted, of which the one above referred to is an example. One section of this species is the Bush Alpine or Green Pine (*Fragaria collina*), these are again sub-divided into red and white varieties. They produce no runners or creeping stalks, and for that reason are propagated either by division of the plants or from seeds. Their habit of growth makes them suitable for edgings. These species may be planted closer together than the other ones referred to below.

Fragaria elatior of botanists, known as the Hautbois strawberry, is a native of central Europe. They are larger, more erect, and longer than the Alpine, often shy bearers, and amongst other peculiarities, possess a distinct musky flavour. "Belle Bordelaise" is one of this type.

Fragaria virginiana is the Virginian strawberry, and the parent of the greater number of the improved strawberries in cultivation.

Fragaria chilensis, the Chilian strawberry, is also a native of America, from Oregon to Chili. This is a large and hardy species with thick leaves, soft and silky underneath, erect fruit stalk, fruit firm in the flesh and sweet. When first introduced it did not find

favour, as the blossoms are not self-fertile. This defect has been got over by crossing with the Virginian strawberry. Very few are now met with, they having more or less crossed with other species.

The strawberry belongs to the order Rosaceæ. It has trifoliate leaves, creeping stolons or runners; flowers white or yellow. The petals of the flowers are disposed around the more or less enlarged receptacle of the flower stalk. The strawberry is not a fruit in the true sense of the word, but an exaggerated fleshy receptacle of the flower stalk in which are embedded a number of small hard seed-like bodies, which are the true fruits. As the swollen fleshy receptacles grow in size and mature they become coloured, juicy and flavoured. In a strictly botanical sense therefore the strawberries are neither berries nor fruit, any more than turnips or potatoes are roots.

One striking peculiarity of the strawberry lies in the fact that some are incapable of producing fruit without the assistance of some more perfectly conformed individuals, not necessarily of the same species.

There is probably no other branch of horticulture in which sexuality is more strikingly illustrated and means as much from a pecuniary point of view to the grower, than in strawberry growing. Several local growers have stated to me that "although they have heard much about 'pistillate' or non self-fertile strawberries, they did not believe in it, and that all strawberries are fertile." This, however, is not so, and those growers' experience of strawberries was evidently somewhat limited.

A glance at the two different types of blossoms will show the difference between a perfect hermaphrodite or bi-sexual blossom, and an imperfect or pistillate blossom.

Both possess petals; in the perfect or bi-sexual blossom, and around the convex core which, when developed, constitutes the strawberry, are two sets of organs, viz.: the female organs or *pistils* in the centre, and around them the male organs or *stamens*. In perfect blossoms, these *stamens* are equal in length, or longer than the *pistils*, and they are then able, when the *anthers* or seed-sacs which surmount each of them are ready to burst, to shed the grains of pollen on the *stigma* or receptive end of the *pistil*, a tubular organ down which they travel to the ovary, where pollination or impregnation takes place.

The imperfect or pistillate flowers, on the other hand, only possess female organs, the *stamens* being either absent or diminutive in size, or else reflexed. Such flower, to produce fruit, must be fertilized by a flower possessing *stamens*. It follows in practice that whenever pistillate varieties are planted, it is necessary to intermix with them bi-sexual or hermaphrodite varieties.

Such intermarriage must be made with discernment, and it is imperative that the sorts to be mated should blossom concurrently, that is to say, an early and a late blossoming variety, however desirable in every other respect, should not be planted closely adjacent; the period of blossoming of the pollenizer or perfect flowering plant should, moreover, be more protracted than that of

the pistillate one, so as to fertilize all the blossoms throughout the blossoming period.

Some growers recommend that the sorts to be mated should ripen about the same time, and be nearly of the same shape and colour, so that they can be picked and sent to the market in the same crate, but this is quite secondary to the main consideration, that of being a free pollinator, blossoming at the time required. It is convenient in that case that the sorts brought together, instead of being intermixed haphazard, should be planted in alternate rows. It is generally considered that one row of perfect or bi-sexual strawberries is sufficient to three rows of pistillate plants. The pollen in that case is conveyed from blossom to blossom by the agency of wind, insects, and notably by bees, which in every well-conducted strawberry garden should receive care and attention.

Although it is recommended that the amateur would do well to avoid pistillates entirely, the commercial grower, on the other hand, will find them as a rule, under proper treatment, more prolific, hardier, and better packers than the majority of strawberries. Nor are all imperfect strawberries exclusively pistillates; amongst them, and especially in the Hautbois and the Chilian strawberries, male organs only are found on separate plants, as well as female organs on others, and the former are strictly staminate. Either of the two if left alone would be barren. Occasionally even these species produce perfect flowers, and it is by propagating such plants by runners that self prolific stock has been raised. When the Chilian strawberries were first introduced in Europe, they found little or no favour, all the plants introduced being found to possess female organs only, and it was not until their cultural peculiarities became better known that they were reinstated to the position they now occupy in the estimation of professional growers.

Another peculiarity with regard to some of these varieties is that the male plants are generally more numerous in runners than the female, and grow to vigorous, healthy plants, which tempt the growers; their selection will, however, only lead to many barren sets being planted.

The conclusion growers should draw from these notes is that although pistillate sorts are highly profitable, they should not be planted alone, but other sorts with perfect flowering organs should be planted as well amongst them.

Strawberries adapt themselves to a wide range of soil and locality. To reach perfection, however, the peculiarities of the several sorts have to be studied and satisfied. Too much sand or too much clay should be avoided. Like other small fruits the strawberry needs a rich, well-drained and moist soil. In Western Australia the soil which as yet has been found best adapted to the cultivation of the greater number of varieties is that which, as on the slopes of the Darling Ranges and the undulating country of the lower plain below, supports in its natural state spear wood thickets and red gum with bracken. Such a soil consists of a deep, light loam, warm in colour, well drained

and generally moist, overlying a stiffer subsoil at a depth of 18 to 24 inches. Of the various species of strawberries the wild wood strawberry (*F. vesca*) and the Hautbois (*F. elatior*) do well on light sandy loams. Calcareous soil of a drier nature suits the Bush Alpine, (*F. collina*) a section of *F. vesca*. A rich clayey loam, moist, but well drained, is better suited to *F. virginiana*, and most of the large fruit strawberries. A stiff heavy clay and soil that is liable to become very dry in a short peroid is unsuitable, and should be avoided. On such soils if once the growth of the plants is checked, the crop likewise suffers and is never again a remunerative one.

As a rule, even the same sorts are influenced by variations in the soil and locality. Thus, all things being equal, a strawberry will ripen earlier on a warm sunny slope in light loam, than on heavier and moister flats, where on the other hand, the crop, if later, is generally a heavier one. The practical deduction to be drawn from these facts is that the experienced growers are careful, in order to lengthen the season, to place early sorts on a warm sunny slope, on light loam, and the later sorts on heavy moist flats. Some varieties besides, which show a healthy growth on high well-drained ground and slopes, are badly affected by leaf-blight when struck in damp hollow ground, and conversely, by moving some of the choicer and more delicate varieties, too blighted to be profitable, from low, damp ground up to more healthy locations, they speedily become more fruitful and more resistent to blight.

Although the land need not be virgin land, it is essential that the plot should be new, that is to say, that it should not have been under strawberry-culture before, or for many years previously. Strawberries, indeed, are gross feeders, and abstract from the ground large quantities of fertilising elements, the depletion of which makes the ground unsuitable for that crop after a period of a few years. Old ground, besides, gets foul with parasitic insects and fungi which prey on the crop. The simplest way of getting rid of such pests is by a system of starvation, which is attained by refraining to plant strawberry after strawberry on the same ground. The ground should be prepared in the spring and laid fallow for the summer preceding planting. If only a small plot, it can be broken up with the spade or the fork to a depth of 12 to 15 inches. If a larger field, two ploughs, one following in the wake of the other with its mould board taken off, should be made to break up the land to a depth of at least 14 inches.

Several harrowings following this deep ploughing reduce the ground to a state of fine tilth, sweetening it by favouring the atmospheric action upon its mass. This clean cultivation also frees the ground of a great many troublesome weeds and of such destructive underground insects as the wire worms, the white grubs of the cockchafer, and other insects that cause injury to the root system of the plant. Besides, the deeper the ground is worked up the better able it will be to absorb and retain moisture, and the greater mass will there be through which the roots will penetrate in search of food and moisture.

When the time of planting comes—about the end of March—the requisite manure is spread over the ground, which is ploughed again to a depth of 6 to 8 inches, and gathered into lands, narrow if the spot is wet, broader if dry; it is then harrowed, and if still lumpy, lightly rolled down.

The strawberry is a gross feeder, and the more liberal the grower is in feeding it, the more prolific it proves itself to be. The crop is, moreover, a perennial one, that is to say, when establishing a strawberry bed we must store at the same time in the ground a stock of fertilisers which will supply all the requirements of the plants for at least three seasons. Nor must the food be stinted to them, but it should be given in plenty and under an easily assimilable form.

These fertilisers should not be buried too deep, for the strawberry feeds in 15 to 18 inches of soil. After the deep fallowing, but before the light ploughing which precedes planting out, the manure is placed on the ground.

If well-rotted stable manure is procurable, manure which is not tainted by sawdust litter, and which is procured from stables where the animals are well fed, nothing is better. Thirty loads to the acre is by no means an excessive dressing, and as the composition of that manure varies according to the class of animals kept, their food, and the way it is secured, it is always advisable to supplement its richness by a further dressing of such chemical fertilisers as kainit or potassium chloride, and of superphosphate of lime, in the proportions of 3 cwt. of kainit and 2 cwt. of superphosphate. The stable manure is evenly scattered first, and the chemical fertilisers broadcasted afterwards, and the land ploughed to a depth of 6 to 7 inches.

The main objection of stable manure, however, is that it generally conveys seeds of troublesome weeds, its haulage is, moreover, costly, and it is not, besides, always possible to get it in sufficient quantity. For these reasons some growers prefer chemical fertilisers at the rate of either, for fairly good land, 5 to 7 cwt. Thomas' phosphate or superphosphate and the same quantity of kainit. For poor hungry land, 8 to 10 cwt. Thomas' phosphate or super and kainit. The mixture is prepared on a floor, or a tarpaulin, by first sifting through a wire screen with ⅛in. meshes, and mixing thoroughly with shovels. One half of this amount applied broadcast is used when giving the last working to the land before planting, and the other half sown between the rows during the first season. Just before planting, a light dressing of ½ cwt. of sulphate of ammonia or of nitrate of soda is given along the rows, and also early the second spring, just as the plants are moving from their dormant state; another similar application will stimulate a vigorous growth and an abundant setting. Should an abundance of unleached wood ashes be procurable it would form an ideal fertiliser, as it contains both potash and phosphate. A dressing of 60 to 80 bushels to the acre broadcasted, would be a liberal one.

After thorough cultivation and manuring, the land should be made smooth and consolidated by rolling.

The time for transplanting having arrived, the plants should be got together. In our climate April will be found a good time. Early in the spring a small crop may be expected. Strawberry plants will strike at any time provided the ground is moist and warm, but autumn planting is found more profitable. If not planted till the spring, all the fruit buds should be removed as they appear, otherwise the plants become feeble and die. Should a large plot be planted, it is advisable to commence with the early sorts and proceed with the latter varieties.

The lines for horse cultivation should be at intervals of 3 ft. or 4ft., for hand cultivation 2ft. will be found enough. In either case the distance along the rows should be from 12 in. to 18 in.; this the grower will regulate as he becomes familiar with the habits of growth of the varieties he plants. For horse cultivation the lines must not only be well stretched, but the plants should all be set on the same side of the line, so that as the implements run along the rows the soil is stirred at an even distance from the plants all along the drill.

The following are the number of plants to the acre at the distances mentioned:

2 ft. x 1 ft ...	21,780	3 ft. x 1 ft. 6 in.	9,658
2 ft. x 1 ft. 6 in.	14,520	4 ft. x 1 ft	10,900
2 ft. x 2 ft ...	10,900	4 ft. x 1 ft. 3 in.	8,712
3 ft. x 1 ft ...	14,520	4 ft. x 1 ft. 6 in.	7,260

It is often the practice, however, to plant strawberries amongst the trees in young orchards, and in that case ample room should be left between the row nearest to the trees and the trees themselves—4ft. to 5 ft. at least; this would reduce the number of strawberry plants to the acre very considerably. Growing strawberries in a young orchard under such conditions is, if the plantation has been well looked after, beneficial to the trees, as the ground is after two or three years left in a high state of fertility and tilth, which cannot but be conducive to the growth of the trees.

If the beginner has not raised his plants himself, he should procure them from a reliable grower, and he should be particularly careful that the parent plants are strong, fruitful, free from leaf blight and other pests. Plants affected by disease are dear at a gift. The rooted runners of the previous year's growth having been lifted and bunched up in convenient handfuls, it is important that their roots are not exposed to the desiccating action of the sun and wind. Some place them over the moist earth with a wet bag thrown over them; others after trimming off the dead leaves and young runners and shortening the roots one third, place them in buckets with an inch or so of water, they will then keep for a day or two. A little quantity of lime or wood ashes in the water would kill any possible slugs which might have secreted themselves amongst the roots of the young plants, and when planting a garden free from such pest every care should be taken against its introduction by means of plants, manure or packages

The planting is done either by means of special tools or almost as

readily by using either a spade or a spading fork, but whatever the method of setting is followed, it is important that the plants be set at the correct depth; that is to say, not too shallow nor too deep, as in one case they would perish from desiccation. and in the other through suffocation in the earth. The right way of setting the young plants is with the crown level with the ground, the roots spread out, and never stuck in gathered up in a bunch. In any case the earth should be well set and pressed firmly around the roots. Plants of even strength alone should be planted together, or else the fruit crops, which generally set in the second year after planting, are otherwise uneven.

If the weather be too dry at the time of planting it is better to suspend this work until the ground is in a better condition. Small plots, however, may be planted even then, provided this is done in the evening when the sun is low, and 1 pint or so of water is given to each plant. The next day break the crust to check evaporation, and if the weather continues dry, water two or three times the first week, then once a week until the rain comes.

Careful cultivation, following up careful selection of plants, set into equally carefully prepared soil, is the third element of success of a strawberry plantation. If possible, do not let a single weed go to seed the first season, and the result will be apparent on the crop the following year. Hoeing should be done whenever a crust forms, a week or two after planting; where horse cultivation is used the hoe should be set shallow—a Planet Junior is excellent for that work—while for a hand hoe, a thin steel tool with both narrow and wide blades, is very convenient—so as not to disturb the young roots. Air and moisture thus freely penetrate the ground, and weeds will be checked. Hand-hoeing alone should, however, be used on the ground around the plants. About the time of the second or third hoeing a slight dressing of sulphate of ammonia or of nitrate of soda, ¼ of a cwt. or a little more, is used with advantage along the rows. This dressing will greatly stimulate the growth of the bushes, which will then begin to show their energy by throwing out runners. These should be treated as weeds the first one or two hoeings, so as to get the plant well established before making any offsets. Cultivation should almost cease from blooming time until fruit is harvested. Weeds and grass gain a foothold during that time, the larger weeds are pulled up by the roots, the ground also sets hard under the tread of the pickers, and from that cause, as well as from the gradual exhaustion of the soil by continuous cropping and also owing to the spread of pests and parasites, a plot ceases to be very profitable after three or four years. After the season's growth and at the approach of the wet weather in winter, the last working is given to the land. Growers in moist localities set their Planet Jr. behind with left and right mould boards, which gather the soil from the plants and make a ridge in the centre, leaving the plants standing in rows of unploughed ground 9 or 10 inches wide. This allows the water to run off, and later on, when the ground is

worked afresh, these ridges are levelled down by the implements, and the soil is made smooth and mellow.

Mulching.

Two or three months after autumn's planting, and before blossoming, it is advisable to coat the ground with some sort of mulching two inches thick. Clean straw or grass, rushes, pine needles or some other such like material may be used for the purpose. Stable manure, owing to the ammonia it gives off and which rots the berries, or makes them too soft and tender to travel, is not to be recommended; it also conveys weeds and many insect enemies. Nor is tan from tanneries, desirable material, since it favours the growth of moulds in the ground which smother and destroy the roots. Mulching, besides answering the purpose of keeping the fruit free of grit and dirt, thereby adding to its marketable value, also chokes weeds, maintains the surface of the ground moist and porous, and adds a large amount of vegetable matter to the soil when ploughed in. In horse cultivation, and where the rows are well apart, it is better to mulch around the plants, leaving the centre of the rows bare, a plan which enables cultivation to proceed whenever required. Any mulch that packs closely will do more harm than good.

The pruning of strawberry plants is very simple. First, when planting, as previously mentioned, all dead and withered leaves are removed and the roots shortened to one-third of their length; then at the time of the first two hoeings all runners are pulled off and all blossoms from autumn-planted strawberries picked until the spring, while it is advisable to pick them all through the first season from strawberries planted in the spring. The necessity of cutting the first runners off is obvious, as, unless this is done, the plants will be weakened and will not bear such a heavy crop of berries. Advantage is thus taken of turning the energies of the plant (always bent on reproducing itself in two directions) from throwing runners and making new plants, iuto producing fruit-buds in abundance, which eventually will mature into a profitable crop. Once the plantation is well established, runners are only permitted in such cases as are required for propagating purposes.

Although it is admitted by all experienced growers that irrigation lengthens the strawberry season, and that a command of water in a dry spring is of great value and often turns into a bountiful crop one which would otherwise have been shortened at a critical period of its growth, yet it is also recognised that irrigation presents serious objections.

It is generally costly when undertaken on a large scale. It makes the ground boggy at the time when cultivation and picking should be actively pursued. It causes a considerable amount of decay of the berries, and given suitable soil and mulching it is unnecessary in those localities where strawberry growing is susceptible of being undertaken with profit.

Likewise deep underground drainage, with the object of turning

unsuitable ground into soil fit for strawberry culture, generally involves growers into an expenditure of time and money which is rarely compensated by an adequate increase of crop. It is better to refrain from growing strawberries on dry, stiff, or marshy ground, than to try to remedy its natural defects by any method involving considerable cost.

Propagation.

The Wild or Alpine strawberries and the Hautbois are the only varieties which may, with a fair amount of certainty, be propagated from seeds; all the others, the Virginians, the Chilian and their numerous crosses are always propagated from rooted runners.

Propagation from seeds is also resorted to for raising new varieties or crosses. Well matured, good fruit is for that purpose reduced to the state of pulp in water, and squeezed through a double piece of cheese cloth to separate the seeds, which are then shade-dried. These seeds are in the spring sown on a well-prepared bed and slightly covered with garden mould or with sand. When the young plants have grown four or five leaves they are taken up by means of a garden trowel and set again in rows or beds to be permanently replanted later on in the autumn, or they may be left in their nursery-beds until required for planting out. These plants will blossom or fruit the subsequent spring, and continue fruiting for several years. During the fruiting season the same treatment as has already been described is given to them, *i.e.*, in the spring and summer they should be watered if necessary, and once or twice during that time all dead leaves should be removed together with such of the runners as are not required for propagation.

Where runners are required, the best plants are selected and marked. Vigour, earliness (if earliness is of value), productiveness, and general excellence and symmetry of fruit are to be considered. The flower stalks are nipped off in an early stage, the ground around kept loose with the hoe, and the runners allowed to strike root until the width of the rows is reduced to 20 inches or so, if horse cultivation is used. The runners forming later in the summer should be cut or torn off with the cultivators. To avoid tearing up rooted runners, experienced growers always cultivate in the same direction; if, on the other hand, their object is to prevent them from rooting, they reverse the operation. Judicious thinning-out of weak or crowded plants in the row is advisable. There is probably no fruit susceptible of such rapid improvement or deterioration as the strawberry, and for that reason it is imperative to keep on roguing out plants which do not grow up to the standard. Some growers, remove altogether the plants selected to a specially prepared bed thus avoiding the danger of young plants running in and mixing with others. Towards mid-summer the rooted runners are cut off from the parent bushes and made into as many plants as there are rooted joints, and set in well-prepared nursery-beds from which they are taken up again in the autumn—April—and planted out. They will begin to bear the following spring.

Runners are produced all the year round, except in winter, when the plant should be dormant, but chiefly during the ripening of the fruit. Those shooting out are not sufficiently strong for planting in the autumn and should be weeded out.

An important point to bear in mind by those who intend growing pistillate strawberries is that of intermarriage, and on this question Mr. H. N. Starnes, in a bulletin on strawberries published by the Georgia Experimental Station, makes some pertinent remarks to the effect that: (1) however good a bi-sexual strawberry is it will fail as a pollenizer to any particular pistillate with which it is desired to mate it unless it be a heavy pollinator; (2) the varieties must bloom approximately at the same time or within a reasonable limit before or after one another, a variation of two or three days making little difference. Then, early blossoming pistillates should be mated with early-blossoming bi-sexuals or hermaphrodites, mid-season with mid-season, and late with late. (3) The time of ripening of the fruit has little or no connection with the period of blossoming, so the pairing cannot be done by merely selecting what are commonly known as early, mid-season and late berries. These terms have reference to the maturity of the fruit, not to contemporaneous blooming. The Stanley, Mt. Vernon, Parker-Earle, Marshall (hermaphrodites) are recommended as pollinators for Sadie, Crescent, Bubock No. 5, Greenville, Haverland (pistillates).

Picking and Packing.

As soon as the berries begin to change colour—which around Perth will be about the beginning of September and somewhat later in cooler lacalities—they should be picked so as to secure the first market. In a week or two and towards the end of September they ripen faster as the summer heat increases, and such is the productiveness of these small bushes that, later in the spring, say towards the beginning of November, two pickings a day are necessary. If the grower has had the forethought of selecting suitable sorts which come in succession, this work will go on unremittingly until the end of February or March.

A few cardinal points must be observed in order to obtain full value in the open market. The picking must be done with neatness, thoroughness and honesty. The berries should hardly be touched with the hands, but just the stalk nipped off between the finger and nail. When dry, all the berries should be gathered at each picking and the sorts should be graded, at first into two grades, and later on when the full season comes all inferior and damaged berries should go to the jam-cask.

As the berries are picked, they are carefully dropped into small wooden punnets holding either one pint or one quart. These punnets should not be filled too high, and it is permissible to place on top some attractive berries. The packing, however, should be honestly done, and all damaged, inferior, or unripe berries excluded from the packages of first-class fruit. At this stage it should be the

grower's business to closely supervise the work of the pickers, and promptly weed out any showing careless, slovenly habits.

The punnets as well as the crates should not be left exposed to the hot sun or the wind. They are not lined with fancy paper or packing of any sort, although a few leaves will add to the appearance of the fruit. As these punnets are filled they are placed in layers in crates. When one layer is filled a piece of cardboard or some thin boards are placed over it, and another layer of punnets set, and so on until the crate is filled, when the lid is fastened down and the package is ready for conveying to considerable distances, care being taken not to turn the crates upside down. The Sydney and the Melbourne markets are in this way supplied with Queensland strawberries early in the season. For long keeping and for distant markets the berries should be picked before they are over-ripe, and of course, the firm-fleshed varieties are for that purpose more suitable than the tender ones.

It is essential that the crates be well ventilated; they should also be branded with the grower's name, and such brand should be a guarantee of uniformity of contents. On a glutted market, a fair name always receives its own reward. For a local trade, the same packages, if carefully handled, may be used several times. A class of punnets which finds much favour with the public, is called the "gift" punnet. It is supplied with a light movable handle, which, when in the crate, is lowered and lies flat, and is otherwise found very handy by buyers for taking their box of strawberries with them from the fruiterers.

Towards the middle of the season, when the price begins to decline, and it is no longer profitable to carefully pick and pack all strawberries which do not come up to a certain standard, the time arrives when jam-makers get their supply from the gardens. These berries, all sorts and conditions, bruised, over-ripe, small or imperfect, are thrown into kegs provided by the jam-makers. Contrary to strawberries intended for the table, these berries which are to be turned into jam, have their fruit stalk and calyx or "nibs" removed. In that condition they are known to the trade as "pulp," for which the growers receive, in the eastern colonies, from 2½d. to 4d. per lb., a price which, for that class of strawberries, pays well.

Mr. F. L. Jansen, in a comprehensive paper on the strawberry, published in the *Agricultural Gazette* of the Department of Agriculture, N.S.W., thus summarises the points of a good strawberry:—"The qualities essential to a first-class variety are: fruit large, of a regular, firm, and nearly uniform size, to the end of the season; texture fine, flesh rich and firm, with a moderate amount of acid, and with an aromatic flavour. A longitudinal cut should show no hollow space; the seeds should be deeply embedded, and the calyx set high so as to be easily detached. The plant should be hardy, vigorous and strong, with perfect flowers, *i.e.*, self-fertilizing, a prolific bearer, with stalks of sufficient length to keep the fruit out of the dirt."

The number of varieties of strawberries which, at one time or

another, have found favour with growers, is now very considerable. Most of them have some special points of merit which make each more or less desirable under the particular prevailing conditions. It is only, however, by experiment, by selection, and by observation of what others are doing elsewhere, under conditions somewhat similar to our own, that we are mainly guided in deciding upon what varieties to grow. The strawberries described in this paper have either proved themselves profitable with us, or are highly recommended by successful growers.

Wood or Alpine Strawberries.

Queen of Four Seasons.—Very early, fruit oblong, dark red, highly perfumed, and most prolific; one of the best of this class can be propagated from seeds; being a smaller kind, a distance of 18 inches between the rows is sufficient, where horse cultivation is not resorted to. Under high culture, will produce a second crop in the autumn.

Hautbois Strawberries.

Belle Bordelaise.—Fruit large, roundish oval, dark purple, flesh firm, white, sweet, and musky flavoured, ripens mid-season, plants very vigorous and productive, answers to forcing.

Prolific or Musk Hautbois.—Very productive, fruit large, dark purple, flesh firm, sweet, musky flavoured, plants strong and productive.

Chilian Strawberries.

Wilmot's Superb.—One of the few of this class now cultivated. Fruit large, showy, roundish or cockscomb-shaped, of a deep pink colour, flesh firm, hollow-cored, fairly good flavour, ripens mid-season, plants strong, and fair bearers.

White Chilian. Yellow Chilian.—Large, showy, roundish fruit, yellowish-white, with a pink tint on the sunny side, flesh firm and sweet, packs and carries well, plant hardy, strong, and fairly productive.

The Chilian and Virginian strawberries have intermingled to such an extent that there are now but very few pure varieties, and most of those described below are the result of the cross fertilization of either of these.

Arthur.—A splendid strawberry, a second edition of Marguerite, being quite as large, but rather better coloured and much firmer. Reported to burn badly in Queensland.

Brandywine.—Plant vigorous; medium sized, dark green leaf; burns somewhat in very dry weather; rather low habit. Berry enormous, conical, regular, deep crimson; ripen evenly; flesh firm; quality good, though somewhat acid. An extremely handsome berry, very productive.

Captain.—Early; fruit large, conical, inclining to cockscomb; colour bright red, glossy; flesh firm, good flavour. Carries well.

Edith.—Very early, and one of the most popular strawberries for early market. An Australian seedling. Fruit large, elongated,

conical, bright crimson; flesh rather tender, white, tinged with salmon colour; pleasant sub-acid flavour. Plant strong, very hardy, and a heavy bearer. Adapts itself readily to a great variety of soils and climate.

Haverland.—This variety has a few stamens, but is practically pistillate. American origin, and perhaps more extensively commended than any other variety. Growth not so luxuriant as some others; in Georgia, reported to burn in dry weather. Leaf medium sized, dark green, with long stems but recumbent habit; sets very few runners, hence adapted to hill culture. Berry very large, long, conical, with yellow, sunken seeds, attractive and sells well; quality fair, productive, and an excellent late market berry, with *Parker Earle* for a mate.

Hoffman.—A Southern States berry, growth vigorous, resists drought well, setting abundant runners; leaf medium in size and colour; habit medium. Berry medium, long, conical, deep scarlet, ripens evenly; quality sprightly, but rather acid. Productive early in season, and particularly valuable on the coast, or on sandy land.

Marguerite.—Very early and popular variety well tested in Australia; fruit large, elongated, conical or cockscomb-shape, bright red, shining; flesh white, tinged with pink; core hollow, lacking a high flavour; seeds rather deeply sunk. Plant robust, very prolific and bears for a long time; a better carrier than Edith.

Mt. Vernon.—A strong excellent, vigorous grower, with large long stemmed, dark leaves, resisting dry weather to perfection, and setting an abundance of runners. A perfect type so far as growth is concerned. Fruit medium, rounded, and abrupt conical, a beautiful scarlet and evenly coloured; quality very good, but berry rather soft. Moderately productive, but an excellent pollinator for late blooming pistillates.

Parker Earle.—A tall, vigorous grower, but burns badly, making, however, a good recovery; sets practically no runners, and hence only adapted to hill culture; leaf medium in size, and green in colour. Berry medium, with distinct neck, long, bright crimson, with a pronounced, rather unpleasant flavour; ripens evenly. Productive and valuable both as a late shipper and pollinator. Requires much moisture to perfect its crop, and does best on heavy soils.

Pink's Prolific.—A splendid late strawberry, does very well in Queensland on low, rich scrub land, being quite free from leaf blight.

Sharpless.—A vigorous and healthy, but straggling grower, standing drought well and setting a sufficiency of runners; leaf large, rather deep green, and fruit very large, irregular and misshapen, many possessing the cockscomb form so characteristic of this variety as to be generally termed the "Sharpless shape." Yet the berries are very handsome, bright scarlet, flesh pink, firm, sweet and good, but with little individuality of flavour; ripens unevenly and inclined to green tips. Fairly productive, will never be discarded as a home berry though not so well adapted to market purposes. Does well in heavy soil.

Sir Joseph Paxton.—Early to medium, excellent, of English origin.

Colour dark glossy red. Flesh pale red, firm and highly flavoured. Plant strong and productive, will not suit every district, but when it will succeed it is useful for all purposes ; does well in a light soil—a good carrier.

Trollope's Victoria.—An excellent English variety, and very popular in Australia. Fruit large, roundish, even outlines; deep bright red. Flesh pale red, tender, juicy. Plants vigorous and prolific; like Edith and Marguerite adapts itself to varied conditions but requires heavy loam to attain perfection, ripens after these two varieties.

Then we have to consider the pests and blights to which this fruit is subject.

Like all highly cultivated plants, the strawberry is affected by parasites of various sorts, of which the most injurious is the Leaf Blight (*Sphoerella fragariæ*), a disease distributed to all parts where strawberries are growing. Some sorts are less affected than others, and the following have the reputation of resisting the disease :—Anna Forest, Bidwell, Bubach No. 5, Crescent, Daisy, Hautbois, Haverland, Mexican, Pink's Prolific, Sharpless, Windsor Chief. The same varieties are affected differently at various stages of their growth. Thus young plants are not so severely affected as older ones, and advantage is taken of this character to renew the crop frequently, that is to say, after two, or at most three, years planting. The leaf blight, when it shows severely before fruiting, directly affects the season's crop, but it generally shows at its worst immediately after fruiting, when the plant is much enfeebled, and the next season's cropping is as a consequence reduced.

A variety which is severely blighted on low, damp ground often recuperates when planted on a higher, healthier, and better drained spot. The converse also applies.

The disease is generally distributed through trade and interchange of plants, and it is, therefore, important that growers in localities where the blight is still unknown should take great trouble to procure plants from growers where the disease is not prevalent.

The disease is easily recognised by the spots on the leaves, which at first are round, small, purplish in colour, and then darker. After a few days the fungus fructifies, and shows on the blotches a grey or white centre. The spots, if numerous, run together, and the leaf withers. The spores which escape from the greyish centre are carried away by even the gentlest breeze, and on alighting on green strawberry leaves they germinate, and after penetrating the cells of these leaves, set up fresh spots. The disease kills a leaf in a few weeks. Whilst it is attacked, the plant makes spasmodic efforts to ripen its fruit. It succeeds in ripening first a few fruit, which, if the plant is severely attacked, are under size, malformed, and look miserable productions. Then the plant shows symptoms of a relapse, struggles through the renewed attack of the disease, partially recovers and ripens a few more fruit, and so on, until, in desperation, the grower grubs the plant up and burns it.

The treatment of the leaf blight must be preventive, for a leaf once spotted can never be restored to its former healthy appearance, the fungus having its location within the tissue of the leaves. Should a few spots show on the young strawberry bushes, in spite of the care which has been exercised in selecting healthy plants only, the simplest remedy is to cut off such leaves, place them in a bucket, take them out of the field, and burn them carefully.

A plantation on contaminated ground is sure to result in a costly failure, firstly, because the blight will soon take possession of the beds, and secondly, because, as has been already pointed out, the ground has, to a great extent, been depleted of its store of plant-food and become strawberry-sick. Old plantations should be carefully lifted and the plants burned.

Early in the spring, just before blossoming, spray with Bordeaux mixture, leave the plants alone when the flowers open, and spray every fortnight during the summer. Three or four sprayings in one season will sufficiently defend the plants against the fungus of the leaf blight. The cost of each spraying in material and labour comes up to about 20s. each time.

BORDEAUX MIXTURE.

A formula easy to remember is the following:—

Sulphate of copper	5 lb.
Quicklime	5 lb.
Molasses	5 lb.
Water	50 gallons.

On the method of combining the ingredients depends the chemical composition and physical structure of the mixture. The sulphate of copper and the lime-milk, if diluted in a small quantity of water settle very quickly, and besides, all the copper sulphate is not taken, up by the lime and turned into copper carbonate. If too much bluestone is in the mixture or if it has not all been taken up, it will scorch the leaves and the young fruit. A simple test is to dip a new nail or a clean blade of a knife into the mixture, when after a little while, if too much bluestone is present, the nail or the blade will be coated over with copper, whereas if the mixture contains a sufficiency of lime no discoloration will take place.

To prepare the mixture (*a*) dissolve the sulphate of copper in half the amount of water, say 25 gallons. This is best done by placing the bluestone in a coarse sack suspended in the water and moving the sack about, when the sulphate will quickly dissolve. (*b*) Make a whitewash of the lime, strain to separate the grit and bring the milk of lime to 25 gallons. Mix *a* and *b*. Where the mixture has been well prepared there is scarcely any settling after an hour, while the improperly made mixture will settle much quicker.

After two or three crops, when the fruit has been harvested and whilst the plants are resting, mow the foliage, both blighted and sound. If no mulching has been used, scatter some dry straw over

the beds, without removing the cut leaves, and after a day or so burn quickly by starting the fire from the weather side. If the ground is not too dry, no ill effect will result, and the plants will spring up with fresh vigour. Where fruit trees occur amongst the strawberry plantation, the blaze might damage them, and in that case another alternative offers. Spray the beds with an acid solution made of sulphuric acid 1 pint, and water 6 gallons. You must pour the acid into the water, not the other way about, which would be risky. This will burn the strawberry tops thoroughly and will rid the beds of spores of parasitic fungi and of insects almost as thoroughly as fire would do. Should the soil contain a moderate amount of lime no injury will be caused. See that the hands and clothes receive no splashes of this acid solution, and wash the syringe immediately after spraying.

Root Fungus.—A white fungus which spreads over the roots and neck of the plant and throttles it. Where the presence of this fungus in the ground is suspected, plough in a good dressing of lime or kainit, or better still of both, before planting the strawberries.

Strawberry Bunch or *Nematode Disease.*—Dr. N. A. Cobb, in the *Agricultural Gazette* of N.S.W., states that this is a disease first noticed in Kent. It manifests itself by the growth of a large number of small abortive branches or leaves arranged in a more or less dense mass, like the head of a cauliflower or a rose-comb of certain fowls. It is the result of the attack of a number of microscopic nematode worms (*Aphelenchus fragariæ*). These worms are armed with a spear or sting in place of a tongue, and with this spear they pierce little holes in the cells of plants and suck out the contents. Such irritation is thus caused to the plant that it begins to grow in an altogether strange manner. Treatment:—Rotation of crops.

Aphis or *Green Flies* often penetrate to the roots of strawberry plants, more particularly in loose, light soil, and do much mischief by sucking the juices and thus impairing the vitality of the plant. A liberal dressing of wood ashes scattered over the rows, and also sprinkling with tobacco, tea, or infusion of quassia chips (1 lb. to 6 or 8 gallons) will destroy a great many of those insects; also a spray made of sulphide of potassium (*Liver of Sulphur*) ½oz. in 1 gallon of water. Burning is mentioned in the case of Leaf-blight Disease. Clean fallowing and rotation will rid the land of that pest.

Slugs are also very destructive. Chimney soot, also kainit, quick-lime or wood ashes along the rows.

Thrips and *Red Spider.*—Dress with powdered sulphur or tobacco-infusion, or sulphide of potassium spray.

Strawberry Beetle, illustrated by Mr. C. French in his handbook of the "Destructive Insects of Victoria." These beetles, one of the worst enemies of the strawberry, bore through and along the stems out to the crown, and quickly kill the plants, which fade and wither away. Plough up and burn the plants every three or four years, and re-plant in a clean place.

White Grubs, or larvæ of the cockchafer. Living in the ground and eat the roots, causing the plants to perish. Treatment: thorough clean fallowing before planting, to starve out the grubs, which live in the ground several years before turning into the perfect beetle. Renew the plantation after three or four years.

Should a few bushes here and there be found to fade away, scratch the ground around, in search of these grubs.

Rats and Mice are also, at times, troublesome.

What is the profitable age for a strawberry bed? Every experienced grower declares that, except in very few circumstances, a strawberry plantation ceases to be profitable after the fourth season. The first year's crop never pays as well as the second and the third, which are the money crops. After that time, the ground becomes impoverished of the elements of plant-food required by the crops, and also gets so foul with spores of blight, and with parasitic insects, that it entails too great a cost of time and money to continue battling against them.

A fair crop of strawberries would, through the season, amount to 1 ton per acre, and many successful growers have picked as much a 2½ tons per acre off well-cultivated, healthy strawberry plantations. If the profits are large, the fact must not be lost sight of that the cost of establishing a strawberry plantation and of marketing the fruit are also enormous. The thorough preparation of the ground, cost of fertilizers, of plants, the planting itself, cultivation, battling against enemies, mulching, picking, packing and marketing a good crop, cost approximately £50 an acre, and when it is reckoned that beside ground specially adapted for the purpose, strawberry culture requires constant, patient and intelligent attention, no one can begrudge to the grower the profit which at times rewards his efforts and his enterprise.

"Anaheim" or "California Vine Disease."

The attention of Colonial viticulturists has recently been drawn to the damage done to the vineyards of Southern California through the ravages of a disease known as the "Anaheim" or "California Vine Disease," a pest said to be more destructive in its effects than the Phylloxera; and the subjoined report by Mr. Lounsbury, Government Entomologist, giving the results of his personal enquiry and inspection during his recent visit to the United States of America, is published for the information of vine-growers and others interested:—

"The so-called "Anaheim" disease is more commonly and properly known as the "California Vine Disease," and the latter term is adopted for use herein.

The disease first appeared about fifteen years ago near Anaheim, a small settlement in Orange County, California, about thirty miles south of the city of Los Angeles. It spread rapidly, and in five years was regarded as one of the most destructive of all plant maladies. The United States Department of Agriculture delegated a well qualified special agent to investigate it, and this officer, Dr. Newton B. Pierce, in 1891 submitted a carefully prepared report on the progress of his work. The report covers over two hundred pages of letterpress, is illustrated with twenty-five full-page plates many of which are in colours, and contains practically all the information known in regard to the disease. This much was told me at Washington by Dr. Galloway, the Chief of the Division of Vegetable Pathology. I was advised, however, to see Dr. Pierce, as the latter was stationed in the affected region and was still pursuing the investigation. Accordingly I visited Santa Ana, where Dr. Pierce is located and which is only a few miles from Anaheim. I was most courteously received, and on learning my errand Dr. Pierce engaged a vehicle and drove me to see infected vineyards. It is mainly from what he showed and told me that day that my information, as hereunder compiled, was derived.

History of the Disease.—The California vine disease was first noticed in 1884, but that it was a new and serious malady was not recognised until well into 1886, when whole vineyards began to die out. From Anaheim as a centre the disease progressed into surrounding districts and was soon rampant throughout most of Orange, Los Angeles and San Bernardino counties. So rapid was its spread that it was observed in vineyards nearly fifty miles away within a year after its gravity was realized. By 1891 about 25,000 acres of vines were dead or dying, and four years later the total acreage destroyed was estimated at fully 30,000. About 1892 the virulence of the malady began to wane, and for several years past there has been comparatively little destruction. The disease is still existent in most of the area that was seriously infected, but the vines now die off one by one and not by whole vineyard after vineyard. It is as if the vineyards of southern California had been visited by a terrible conflagration that still continues to smoulder.

Varieties of Vine attacked.—Some kinds of grape are much more resistent to the disease than others, but there is no variety known that wholly withstands it. Wild vines growing in the mountain valleys away from the vineyards were reached and destroyed, and varieties native to the eastern United States appear to be only partially resistant; some of them succumb completely. Trellised vines are killed along with standards. The common wine grape of the districts concerned is the Mission grape, and this variety is especially sensitive. The common raisin grape is the Muscat of Alexandria, and in it the disease works relatively slowly though no less surely. When the disease first appeared and the people saw the Mission vines dying all about them whilst the Muscats remained apparently healthy, many regarded the destruction as a judgment

from above on the wine traffic; but this illusion was soon dissipated.

Opportunity to observe the action of the disease on grafted vines has not been extensive. Phylloxera has never obtained a foothold in the southern counties and hence there has not been the necessity to graft. Yet numerous instances of grafted vines occurred in devastated vineyards, and a study of these led to the conclusions that roots of hardy stock do not preserve tender tops for any great length of time, and that the power to resist the disease depends more on the top than on the root.

Character of the Disease.—The originating cause of the disease remains to be discovered. Taken as a whole the facts elicited by Dr. Pierce's investigations seem to indicate the existence of a micro-organism within the plant which in the heat of summer interferes with the normal physiological relations of the different parts. But the most painstaking research has thus far failed to verify this view by the isolation of any organism that can be shown to have an intimate connection with the disease. Bacteria have been found in the diseased tissues and have been suspected, but very little evidence found against them. A French scientist some years ago claimed to have discovered a parasitic slime mould in diseased foliage, but his findings were not substantiated by Dr. Pierce in more recent studies.

The investigations that have been conducted have shown conclusively that the malady does not arise, at least directly, from any climatic condition, from lack of moisture or surfeit of it, or from soil poverty in any form.

Effects on the Vine.—How, where, and when the disease gains entrance to the plant is unknown. Likewise which part is first affected. The first symptom of the diseased condition is shown by the foliage, which becomes peculiarly mottled and drops prematurely. The sap becomes scant, and the canes die back through the failure of the foliage to perform its functions. Meanwhile the tips of the roots begin to decay, and the disorganization proceeds slowly or quickly as the case may be from the terminal parts both above and below the surface towards the main stem. Ten years ago, when the disease was highly virulent, vines generally died in two or three years from the time they were noticed to be suffering. Now vines may linger on for five years or longer and one or more branches continue to survive after the other branches are quite dead; and occasionally there are cases of apparent recovery. Similarly, while at first the vines succumbed with seemingly no regard to their situation or physical condition, the vines now in the most unfavourable section of a vineyard and those suffering from other causes are the first to die. And while dying vines may occur here and there all over a vineyard and all the vines be slightly affected, the vineyard as a whole may live on and remain profitable for a number of years. Shade is unfavourable to the progress of the malady, and in many vineyards now diseased but dying slowly, rows of vines which

chance to be sheltered from the sun by trees or otherwise for much of the day are decidedly stronger and more vigorous than those in the full sunlight.

How the Disease Spreads.—In the great outburst of the disease, vineyards for long distances about Anaheim became so quickly infected that it was impossible to decide with certainty whether the disease really radiated from a centre or spontaneously originated in section after section. Observations afterwards, however, led to the conclusion that the trouble really spread from vine to vine and was independent of climatic, soil, or cultural conditions such as might account for a trouble originating spontaneously. It was seen that vineyards started after the outbreak from unquestionably healthy cuttings procured beyond the infected area might contract the disease and die. And further study revealed the fact that cuttings from diseased vines are themselves diseased, and that although they may strike root and flourish for a season or more the resulting vines are foredoomed.

It has not been actually demonstrated that the disease can *spread* from a vine produced from a cutting of a diseased plant when such new vine is grown remote from a source of infection. The vine from the diseased cutting may die, and also other vines propagated from wood of that vine; but there is a possibility, it seems, that these vines die from transmitted effects of the disease, and not, strictly speaking, from the disease itself. The malady was so terrible in its ravages, however, that no sane man would care to jeopardize healthy vineyards by attempting to settle the question experimentally. As matters stand, then, we do not know whether or not the disease can be introduced into South Africa with cuttings of diseased plants.

What is said to be unmistakably the disease in question has recently appeared in a mild form in a portion of the Sacramento Valley six or more hundred miles above the southern infected area. It also exists, or did exist for a time, in a part of Arizona; and an occurrence is now suspected in the Snake River section of the State of Washington. These outbreaks may or may not have anything in common with the main occurrence. The rumoured occurrences in other parts of the United States and in foreign countries are not known to have any basis in fact.

Dr. Pierce believes that we would run no risk of introducing the disease with cuttings of vines from California were we to procure such cuttings from areas which are known, positively, to be entirely free of the disease. To get cuttings from any of the southern counties, however desirable the varieties might be and however much we might quarantine them, would, he thinks, be extremely foolhardy, since the disease might possibly be in the cuttings and not become apparent until after the lapse of several years. He cites the San Joaquin Valley as an extensive grape-growing area from which it is safe to make importations; and he told me that he would gladly advise our Colonial Government at any time with regard to the safety

of importing from any particular locality. Personally, I am of the opinion that we should refrain from obtaining cuttings from California and other Pacific slope sources except in such a highly exceptional case as that of some variety of particular value being nowhere else procurable. Such an exception may never arise and yet may any year. For instance, a new grape is now being propagated which might prove to be very advantageous in some of our raisin districts. This is a hybrid which Dr. Pierce has succeeded in producing; it lacks the objectionable character which the common Californian raisin grape (Muscat of Alexandria) has of setting irregularly under some climatic conditions at the time of bloom. Other than in such a case as this we had better leave Pacific coast vines severely alone.

CHAS. P. LOUNSBURY,
Government Entomologist.

The Under Secretary for Agriculture, Cape Town.
December 7th, 1900.

Facts on Thinning.

A bulletin from the Utah Experiment Station says:—

"Experiments have shown that one year's thinning may influence the two following crops. In the writer's work with plums and apricots this was very noticeable. Trees which were thinned in 1897 gave from two to eight times as much fruit in 1898 as did unthinned trees of the same varieties. It should be remarked that there was a light set of fruit in 1898, not enough, in fact, to require thinning. The trees thinned in 1897 did not set as much fruit in 1899 as did the unthinned trees, but it was more evenly distributed, and a portion had to be removed. With apricots in 1897 the trees thinned early and severely produced fruit of such size that 17 weighed a pound. With the unthinned trees of the same varieties 28½ fruits were required for one pound. During the season of 1898 and 1899 the trees thinned early and severely in 1897 could readily be picked out by their larger and more evenly distributed fruit."

Prices for Vineyards on the Moselle.

Papers received by last mail bring the news of the most extraordinary prices for existing vineyards and land suitable for such having been paid at the Moselle.

Not so very many years ago the square meter, or roughly square yard, the distance at which vines are planted here, realised on an

average 3 marks or shillings, and it was a great surprise when a little over two years ago some vineyards realised 30 marks, and the celebrated Bernkasteler Doctor 60 marks per square meter. Quite recently now the latter vineyard has changed hands and has been acquired by the well-known firm of Messrs. Deinhard & Co., of Coblenz, Ajkhein, for 100 marks or £5 per vine. In other parts 18·5 marks per square meter were realised, whilst raw forest land fetched from £56 5s. to £110 for an area equal to one Cape morgen.—C.M.

MISCELLANEOUS.

National Forestry.

The following paper by Mr. D. E. Hutchins, Conservator of Forests, Cape Town, was recently read before the Society of Arts, and for which its author has been awarded the Society's Silver Medal :—

"Some years ago, when last on leave in England, I climbed one of the highest of the Welsh mountains, and gazed with sorrow on the prospect around. Barren heather-clad hills bounded the view on every side, affording, I was told, but a scant pasturage for the few lean flocks of sheep I had seen on its slopes. It was an ideal forest country. Old records and names indicate more or less exactly where the forest once stood. The climate is a superb one for forests. I can readily imagine the close, clean, mast-like stems it must have produced. What would we not do with such a range of country in South Africa ?

Now it pastures a few sheep! Sheep that could be pastured better in Australia or in South Africa, where it is too dry or hot to grow coniferous timber. When the old forest was cut down the usual soil deterioration followed. What was once a rich forest soil is now barren moorland. The contrast was all the greater as I had come straight from a tour in the Black Forest in Germany, where the reverse side of the picture is strikingly presented. There almost every square yard is utilised. In the fertile bottom lands of the valleys, sheltered and enriched by the forest, are villages, hamlets, cultivated lands and factories. Factories, worked by water from forest streams, where the air seems as clear and pure as on the Alps. Above and all around, stretching over an apparently limitless expanse of rolling hills, lies the glorious forest, natural in its beauty, artificial in its productiveness. In the valleys are the spas, whither flees the German in summer as the Englishman to his seaside watering place. Few would hesitate which to choose if there were forests in England.

Surely the æsthetic side of forests would have some influence on a not too artistic national character! I know of no reason why there should not be another "Black" forest on Dartmoor or Exmoor. Nor why we should not see in England that fair landscape of sea and forest that has rendered Knysna famous throughout South Africa. Is there any valid reason why many as fair a scene should not be reproduced in England to-day? It is my object in the following pages to submit certain facts bearing on this important subject, facts well worthy of earnest consideration at the present time. If England and the British Isles are to be restored to their former beauty and productiveness, reforesting is essential.

A quarter of a century spent in the administration of national forest estates in India and the Colonies enables me to affirm the proposition with some confidence, that the great want of England at the close of this nineteenth century is National Forestry.

State Forestry in England and Abroad; its Cost and Superiority to Private Forestry.

Let me at the outset clear the ground by saying that the forestry for which I plead is not the necessarily fitful efforts of a few private landowners, nor the founding of quasi-chairs of forestry at certain agricultural schools; but the national forestry of a powerful Government department, properly manned and officered with scientific men; a department which, with a million pounds sterling to spend yearly, should work steadily at the formation of national forests, in the sense in which this term is understood in most other civilised countries, but especially on the continent of Europe.

There seems to be a consensus of scientific opinion in England now that national forestry should be taken in hand as a national work, and prosecuted as a sacred obligation to posterity, as far above party politics as is the national credit and payment of interest on the public debt.

The way to this end is perfectly clear. Of all the means that have been tried in various countries, but one has given permanent results. A distinct branch of the public service must be formed. It must be gradually built up of professional forest men, specially trained and educated to their work at schools and universities, such as the Government of India now maintains at Cooper's Hill and Dehra Dun. Forestry would have to be added to the curriculum at every technical school; then the spread of education would rapidly put an end to such a sad farce as the present state of the historical New Forest in Hampshire. There one sees nearly 100 square miles in the heart of fertile England solemnly condemned by a special Act of Parliament to perpetual waste and mismanagement. It is as if the Legislature were to itself attempt to treat an intricate medical case; a case, too, that requires a different treatment at every stage, and a treatment that must be gradually varied as skilled experience is gained.

It is difficult for the inhabitant of an inland country, such as the Transvaal or Switzerland, to realise all that is meant by the sea,

sailors, fishermen, a navy, and naval men. I have constantly experienced the same difficulty in speaking to Englishmen of forests, forestry, foresters, and forest officers. To the average Englishman a forest is simply a collection of trees, at best badly grown trees. The English parks throw him off the scent. Speak to him of a forest officer, his mind runs to a park keeper or gardener. Of all that is meant by a close, clean, high-timber forest; of its peculiar condition of soil and climate, its varied requirements and skilled treatment, he is as ignorant as a Chinaman of electricity. There is not a forest scene by an English painter in the National Gallery, and very few by foreign painters!

I have in my hands the prospectus of a West Australian forest company, and the report attached of an unprofessional gentleman sent out to report on the forest. It contains an error sufficient to wreck the concern. Will it be believed that no expert literature in English exists on any of the Australian forests, vast though they are, and estimated to be worth many hundred million pounds sterling? In spite of the protests of an enlightened and far-seeing few, little is thought of but forest destruction, with or without some return in money. The wanton destruction of the unique Kauri forest in New Zealand is one of the saddest spectacles on this fair globe of ours. Kauri is a class of tree that will never be replanted; while the forest, as a whole, could be worked conservatively nearly as profitable as it is now being destroyed. Broadly speaking, when as a colonist the Englishman goes abroad he proceeds, like the Spaniard in Mexico, to destroy as a nuisance the forest that he encounters. He calls the forest "bush" in Australia and South Africa, and "jungle" in India. Timber was expressively christened "lumber" in America. As was justly observed by a recent eminent writer:—"In not one of the English colonies is the forest question seriously considered, if we except India and Cape Colony." A variety of circumstances led up to the conservation of the forests of India; the genius of one German (Sir Dietrich Brandis) founded the Indian Forest Department. The only complete organisation of its kind among English-speaking people. The Cape Forest Department owes its formation and usefulness mainly (I fear it must be confessed) to the fact that half of the European colonists at the Cape are *not* of English extraction. The neighbouring colony of Natal, the "English Colony" of South Africa, after the temporary employment of an able forest officer from the Cape, and an exceptionally good professional man from Germany, has now gone the way of other English colonies. Three-quarters of its rare indigenous forest is hopelessly destroyed, and the remainder, now under only nominal conservation, is fast disappearing.

Along with the training of a body of professional English forest men there would, of course, be required an annual vote for the formation and tending of the national forests. For many years the largest portion of this vote would be expended on formation, *i.e.*, in the planting and acquisition of suitably situated forest lands as these

came into the market. In this way the national forest estates, the glory of generations of Englishmen yet unborn, would be gradually built up. The present low price of land in the British Isles offers exceptional advantages for the early initiation of such a scheme. France spends yearly somewhat over £500,000 sterling on its forests. Of this about one-half is expended on forest officials and their education. In Germany relatively more is spent on forest work, as the wood is there felled by departmental agency and brought to the roadside. The total value of the German forests is reckoned at £900,000,000 sterling, capitalising at 2½ per cent. on an annual out-turn of 60,000,000 cubic metres, valued at from £20,000,000 to £22,500,000 (Professor Gayer).

Coming to a British colony, the yearly budget provision for forest work at the Cape amounts to upwards of £60,000, which is somewhat over 1 per cent. of the total yearly expenditure of the colony.

If England were to re-forest at the same rate proportionately, 1 per cent. of the national expenditure would represent an amount of about £1,000,000 sterling as the annual forest budget. If this sum were voted annually by Parliament it would suffice for re-foresting yearly about 100 square miles, or say the present area of the New Forest in Hampshire, taking planting and fencing at £5 per acre, and the average cost of the land purchased at £10 per acre. While much of the land required for re-foresting—sand, mountain and moor—could be obtained at very low rates, other land that it is desirable to re-forest would cost £15 or £20 per acre. This is a work to be undertaken in the prosperous days of a country's history. The report of the recent Recess Committee on the Establishment of a Department of Agriculture and Industries for Ireland estimated that to re-forest 3,000,000 acres in Ireland would cost £20,000,000 sterling. No doubt Ireland alone is capable of producing one-half the present importation of wood from abroad into the British Isles. The present percentage of woodland in Great Britain and Ireland is 4 per cent.; while in Cape Colony, with its wide, treeless plains, forests cover only ¼ per cent. of the whole area. While some of the Colonies are in the position of having more forest than they want or than is desirable, the proportion of woodlands to open country represents in the mother country a miserably deficient quantum. If we look at the position of Great Britain and Ireland among the States of Europe it will be seen that in forestry it occupies the lowest place, standing below all the European States. It is even 1 per cent. worse off than Portugal. *In Germany 25 per cent. of the country is wooded.* This is the proportion that is considered usually desirable in a well-regulated country. The percentage of woodlands in the British Isles would be raised by 7 if there were planted the 10,000 square miles or thereabouts required to produce at home the present importation of wood and forest produced from abroad. The following is the proportion of woodland in some of the more important European States:—*

* Schlich and Nisbet.

	Percentage of Woodlands.	
Russia in Europe ...	... 36	Scientifically conserved and permanent.
Austria	... 30	
Germany	... 26	
Switzerland ...	... 19	
France	... 17	
Portugal	... 5	
Great Britain and Ireland	... 4	Parks, small plantations, &c.

France has one colony in a temperate climate comparable to the Cape and Australia—viz., Algeria. Here the Forest Department was inaugurated along with other branches of the public service as soon as the country was settled; and Algeria has to-day about 8,000 square miles of State forest managed by the Forest Department, about the same area which cannot for political reasons at once be brought under forest management, and a further area of about 1,500 square miles of private and communal forest, partially managed by the Government Forest Department. Altogether it is estimated that 5 per cent. of the area of Algeria is wooded.

Nearly one and a half millions are spent yearly on foreign missions. This expenditure is of a sacred nature, but so are trees to those who live in the forest and study its laws and well being. We want missionaries to go abroad amongst people who know not the forest, missionaries who should speak of its ennobling qualities, its beauty, and its necessity on God's earth. It is a curious reflection that if a like sum were spent yearly in reforesting in Britain, the desecrated and would be restored to its former glory in three generations. Take one item, the rubbish heaps from the mines in Cornwall and the Black Country. A distinguished forest officer lately formulated a perfectly feasible scheme for afforesting these. I have not heard that any mining owner, wealthy though they mostly are, has yet planted an acre. A mine owner expects some better return than a doubtful 2½ per cent. on his outlay. Nor is he usually content to wait till his grandson's time for this poor and uncertain return. There is too often an element of uncertainty in the return from small private plantations. The State should do this work. Some one will object that the rubbish heaps are private property, and as such are sacred. Doubtless; but they are also a national eyesore. The Legislature should deal with them as the French do with their sand-drifts. If the owners cannot or will not afforest, let the State do it, retaining always the management by its own forest officers, but paying to the owner the difference between revenue and cost of management.

Similarly with municipal or other forests owned by any public corporation, such as a County Council. These must be managed by the Government forest officers to ensure the requisite continuity and stability in the operations. This proposition may sound bureaucratic and repugnant to English ideas of local self-government; but it is a matter that has been thoroughly threshed out on the Continent of

Europe, and the same conclusion arrived at by such differently complexioned States as Germany, Austria, France and Switzerland. Corporate forests thus managed are but little inferior in condition and yield to those owned by the State. All net revenue is of course paid to the corporate owner.

Forests in Europe fall into three classes :—

(1) Those owned and managed by the State.
(2) Those owned by corporations, but managed by the State.
(3) Those owned by private individuals.

Forestry in England is in the peculiarly unfortunate position of only being represented by usually ill-managed woods of the third class. No useful purpose would be served by attempting to palliate this fact, or by citing brilliant exceptions to the contrary. The planting in the Scotch Highlands should receive public recognition. I have heard of a landowner in South Wales who has planted 10,600 acres of larch, and of a large English landowner who has obtained the services of a German expert to draw up a scientific working plan for his woodlands. Such exceptions cannot in the nature of things last long. There is rarely a guarantee that they will last beyond one lifetime. It would be one of the functions of national forestry to assist private forest enterprise in every way ; not to supplant or forestall it. State forests worked at long rotations would supply the large clean timber now imported from abroad. Private forests, on account of the necessary length of rotations, cannot do this; they continue to supply pit props, poles, sleepers, and special timber, such as figured ash, hedgerow elm, &c.

Compared with State forests, private forests are at a disadvantage on these three points :—

(1) *Changing Ownership.*—The careful landowner may have a spendthrift son, or one of different tastes. The estate may have to be sold for various reasons. This usually entails a rupture of the working plan, together with the scientific working of the woodlands.

(2) *Interest on Borrowed Capital.*—The State can raise loans at 2 per cent. interest. The private forest owner would have to pay double this, or more, on the uncertain security of a private forest.

(3) *Cost of Management.*—A large forest estate can be more economically managed than a small one.

Thus we arrive at the curious fact (in sharp contrast to the general position) that forests are better and more profitably worked in the hands of Government than by private owners.

The assistance rendered by Government to private forest owners in Europe (and latterly America) takes the form of grants of young trees free, or at cheap rates ; advice in drawing up working plans ; and last, but not least, the example, which is better than precept, of scientifically managed forests yielding good returns dotted throughout the country.

IMPORTED WOOD AND THE AREA REQUIRED TO PRODUCE IT IN ENGLAND.

England imports practically the whole of her wood—a necessary of life. This is in itself a bad position to anyone but a rabid free-trader. Worse than this, though, foreign supplies are becoming exhausted. Wood must rise in value, and taking a century or more to produce, timber forms an exception to the ordinary laws of supply and demand. The time is not far distant when every civilised country will want all the wood it can produce. Germany, Austria, France and Switzerland have scientifically managed national forests, but these will not do more than satisfy their own requirements in the future.

The timber and forest produce imported into the British Isles, and that could be produced equally well in this country, represent a value of about £20,750,000 sterling.

Importation of Wood Producible in Britain.—The last returns published by the Board of Agriculture give the following figures for 1896:—

Fir	£16,000,000
Oak (including staves)	1,500,000
Various	1,649,000

If we take one-third of the last figure as producible in Britain, we have a total of £18,000,000, for imported timber producible in Britain. This is exclusive of nearly a million's worth of manufactured house and furniture wood, of which nearly the whole comes from Europe or North America, and is producible in England. It is exclusive, also, of £1,750,000 for wood pulp; of tar (mostly Russian), £74,000; rosin, £419,000; turpentine, £490,000 (both nearly all from U.S.A.); or home producible timber, rough and sawn, £18,000,000; manufactured, £1,000,000; forest produce about £3,000,000, of which £1,750,000 for wood-pulp is certainly producible in Britain; total timber and produce, certainly producible in England, £20,750,000. A curiosity of forest produce importations is £114,000 for moss and forest litter.

At ordinary rates of yield this would require about 9,000,000 acres for its production—9,000,000 out of 77,750,000 acres, the total area of the British Isles. This is not quite 1 acre of forest to every 8½ acres of open country. Germany has 1 acre of forest to every 4 acres of open country.

Compare this £20,750,000 with £25,000,000, the present cost of the National Debt. Our forest improvidence costs us nearly as much as our National Debt!

The question as to the quantity of land available for reforesting in Great Britain and Ireland is discussed by Dr. Schlich in his admirable "Manual of Forestry," of which the final volumes have been recently published. And his conclusion is that the moors, mountain land and waste land generally, added to the area which is at present more or less imperfectly wooded, are large enough to yield easily all the

timber and forest produce now imported. The Recess Committee a few years back reported that Ireland alone has 3,000,000 acres available for reforestation. Geographical text-books tell us that one-fourth of the area of England is waste, *i.e.*, neither arable nor permanent pasture land, and that in Wales not much above half the land is in pasture or under cultivation; while in Scotland only about one fourth the area is arable. Ireland, like England, has about one-fourth of its area waste, *i.e.*, neither cropped nor meadow land. Altogether, the cultivable area of the United Kingdom is little above one-half the total area, 58 per cent., thus leaving ample room for forests.

Recently, when discussing the forest question with a prominent member of the present Government, I was met by the assertion that the British Isles are too densely populated to produce at home the present sea-borne timber. This, however, though a common popular error, is far from being the case. Only to cross the Channel, there is the example of Belgium with a denser population than England and better forest. Indeed, it may be useful to glance briefly at what Belgium, with a population the densest in Europe, is doing to improve its forests.

Belgium pays nearly £3,000,000 for imported wood, and produces £4,000,000 worth yearly from its own forests. Strong efforts are being made to improve the forests and reduce the imported wood. A considerable sum is set apart every year by the State for the acquisition of waste lands or ruined forests; and it pays one-third of the cost of planting up large areas of village waste for the benefit of the communes concerned. There is a Central Society of Forestry, consisting of 900 members belonging to all classes, from the King and his Senators down to small landowners and their agents and even tradesmen. The society endeavours to spread a due understanding of the objects and benefits of sylviculture by means of a journal, by public conferences and trips to the forest, and by free advice.

But Belgian forest work is quite recent. As late as 1884 the forests were being mismanaged and alienated. Shortly afterwards an independent forest administration was established under a director, and in 1893 the "Conseil Superieur" was added. This consists of at least twenty-four members, representing different districts, and competent to advise on all forest questions. In 1895 the game and fishing laws were brought under the forest administration. The forest area of Belgium comprises: public, about 500,000 acres; private, 1,250,000.

The private forests are thus about one-sixth the total area of the country. Belgian forest officers were formerly trained at Nancy or Tharandt, but they are now put through a three years' course in Belgium.

The areas that suggest themselves for extensive reforesting operations within the British Isles are the mountains of Wales, the English Lake Country and the Scotch moors and Highlands; the "downs," so common everywhere; together with the wolds and other areas where the forest has been destroyed in recent times—the Yorkshire

and Lancashire Wolds, the Cotswolds, the Weald of Kent. (The word *wold* comes from the Anglo-Saxon *weald,* and is the same as *wald,* the modern German for forest.) Then there are the now barren and almost waste English moors; desolate Exmoor; the wet tor-crowned tableland of Dartmoor; the bleak Yorkshire moors; the peaty Lancashire moors, also the bogs of Ireland. The reforesting of the moors and bogs would not be so easy as work on the mountains and wolds. With the destruction of the forest has gone the rich forest soil and forest drainage. Much of the reforesting of the moors and bogs would have to be left to the gradual operations of nature, neighbouring plantations affording shelter, drainage and seed. Darwin, Ruskin, and various English writers speak of the wonderful power possessed by Scotch pine of gradually spreading itself, self-sown, over adjoining waste lands. Cluster pine has the same power in the more temperate fertile parts of South Africa.

But, wherever possible, wherever the price of land be not too high, the future State forests should be located near the great centres of population, on account of markets and the bulky nature of wood and woody produce; for the health and recreation of the people; and, as regards London and other important centres, for defensive purposes. Consider the beautiful forests in the neighbourhood of Paris.

(To be continued.)

Locust Destruction and Use of Fungus.

In view of the doubts recently expressed in several quarters as to the efficacy of the fungus for destroying locusts, the following further reports by Mr. C. W. Sparkes, Government Locust Expert, giving the result of experiments conducted by him are published for general information:—

I have the honour to report as follows on my work during the week ended 8th December, 1900.

On Monday, Tuesday and Wednesday, the 3rd, 4th and 5th instant, I visited the Wolff River District, and, though heavy rains fell during that time, which made the Wolff River impassable in many places, I was able to traverse enough of the district to enable me to report it entirely free from locusts.

On Thursday and Friday I visited the Burns Hill district, and found that there also all the locusts had reached the flying stage and left the district.

On Saturday the 8th instant I visited the Gxulu district to inspect a swarm of locusts reported to me to be dying.

I found several acres on a hill-side covered with dead and dying locusts; this was within a quarter of a mile of where I had inoculated

a swarm of voetgangers some time previously. I examined these locusts and found them free from the maggot that has been attacking some swarms.

C. W. SPARKES,
Govt. Locust Expert.

Middle Drift, King William's Town,
15th December, 1900.

I have the honour to submit the following report, for your information, on the result of the use of locust fungus on flying and voetganger locusts.

Shortly after my arrival at Keiskama Hoek, viz., October 26th, I inoculated a swarm of voetgangers on the village commonage. At the time of inoculation rain was falling. On the fifth day after inoculation the locusts commenced to die, and within a fortnight the whole swarm disappeared. Three days after inoculation the locusts became very sluggish, and at no time moved more than two hundred yards from the place of inoculation.

On October the 31st I inoculated a large swarm of voetgangers on Mr. Radloff's farm. About the fifth day after inoculation the locusts commenced to die, and I collected some of the dead locusts to send to the Bacteriological Institute, Graham's Town. A few days after I received a letter from the Acting Director of the Bacteriological Institute, informing me that, from the dead voetgangers I sent him, he had obtained a growth of locust disease fungus.

Another swarm I infected on the Keiskama Hoek commonage were inoculated when in the voetganger stage, and changed into the flying stage before dying. Some died before changing, but the majority died in the winged stage, though they only moved a few yards from the place where I inoculated them.

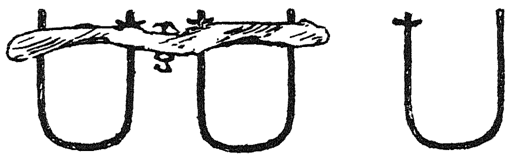
In the Gxulu district, I inoculated a swarm of voetgangers, the weather at the time being very hot and very dry, and the locusts almost ready to change into the winged stage. From the information I was able to gather these locusts showed no signs of being diseased before changing into the winged stage. About three weeks after inoculation, and after the locusts getting their wings, heavy rains fell. After the rain I visited the swarm and found several acres on a hillside covered with dead and dying locusts. As it had been reported to me that a maggot was attacking the locusts, I examined these and found them free from the maggot.

A number of swarms of voetgangers I inoculated in the near vicinity of Keiskama Hoek were destroyed by private individuals, by means of soap and water. Several of these swarms showed unmistakeable signs of being diseased, before being destroyed by spraying.

C. W. SPARKES,
Govt. Locust Expert.

Graham's Town, 29th December, 1900.

Yoking Oxen.



YOKE AND BOWS. BOW AND YOKESTICK.

The yoke is made of tough wood hollowed out a little to fit the necks of the oxen, and made smooth. There are four holes or slots for the ends of the bows to pass through. The bows are formed of turned $1\frac{1}{2}$ inch rods of tough wood bent by steam, and kept in their places by a crooked stick passing through the end above the yoke.

As far as we can learn there are three principal modes of yoking oxen in different parts of the world. First there is the yoke and bow method used in England, America and Australia, and other English colonies and some continental countries. Second, there is the method of South Africa, and we don't know that the plan is adopted anywhere else. Third, the plan of yoking by the horns, as is the usual way in Spain and Italy, and this is the plan in use generally in oriental countries. The yoke has a place scooped out where it lies over the head, and also wherein the horns are fitted: and then a strap (stout leather) is passed twice around the horns, yoke and forehead, and the end fastened in a notch at the top of the yoke. The tongue of the cart or wagon is passed through the chain that depends from the iron strap that circles the yoke, and the team is ready for any work. It is contended by those who use this method of yoking by the horns, that the oxen draw more and better than when yoked by the yoke and bows on the English and American plan. It would be interesting to see the three methods tried in competition. We have no hesitation in saying that oxen yoked after the English plan can pull much more and easier than when yoked in our colonial fashion. It allows the ox to throw his whole strength and weight into the pull, and the bow does not press on the windpipe. The length and size of the yoke are adapted to the size of the oxen, and the position of the yoke resting on the oxen's necks is made smooth, as well as the bows, so that there may be no chafing.

What goes against the English plan is that it is more trouble to inspan What may be the comparative merits of yoking by the horns and by the English fashion, we have no means of judging, but we all know it is the fighting attitude of the animal, and obviously he can put all his muscular power into this method of propulsion. We have seen oxen worked in harness like horses, and their owners believed they were able to do more work and to do it more easily than in yokes and bows. It is found a good plan to work shorthorn or other bulls, which for their value have to be kept under lock

and key. It keeps them quiet and docile, and properly harnessed in a cart they are very handy on a farm to take out corn and potatoes to the field and do such like jobs as would usually be the work of a horse and cart.

Mr. Bodden, who after living several years in Queensland came to this country, and at one time was on Mr. Irvine's establishment at Waterford, when living on his farm near East London, and not being able to get the wooden bows, had some iron ones made which answered very well. He was very well satisfied with the change, and said he believed his four oxen in yokes and bows could do work equal to six inspanned in the usual way. We have heard that our colonial plan was derived or imported in the old times from Batavia, where the oxen are humped to some extent. Of this idea or statement we shall be glad to get any further information. EDITOR.

Imphee Molasses.

Making sugar from sorghum (imphee) was at one time attempted on a considerable scale in America, and some crystallized sugar was manufactured but in small proportion, as the greater part of the product proved to be uncrystallizable, or molasses. Only one or two factories have been kept up and these are content with molasses making. From the *Louisiana Sugar Cultivator* we learn that :—

"The Ft. Scott sugar plant, which is now the property of the Fort Scott Syrup Manufacturing Company, and which has been idle for a number of years, has resumed. R. Best, son of the new owner, is in charge. Its capacity, according to previous records, is about 125 tons of cane per day, but Mr. Best hopes to increase it to 150 tons daily. The product of the syrup factory this year will be two grades of syrup—one for table use and one to be sold to mixers for the manufacture of glucose. Mr. Best says the company will employ about fifty men during the season."—EDITOR.

Eight Reasons why some Dairymen Fail.

1. The cows do not get all they want to eat.
2. The cows are not fed a proper ration—that is, the right kind of food.
3. Neither winter shelter nor summer shade is provided for the cows.
4. The poor cows are not weeded out of the herd. All mature cows that will not produce 200 lb. butter fat in a year should be disposed of.

5. The percentage of poor cows is too large because good dairy bulls are not used.
6. The cows are not milked for more than six months out of the twelve.
7. The dairyman provides neither green food for summer, nor hay or ensilage for winter.
8. Too much of the butter is made during the hot months, when butter is low. It should be made during the cold months, when butter brings a better price.—*Farm and Home.*

Technical Terms Used in the Bradford Wool Trade.

For the information of Colonial sheep farmers the *British Australasian and New Zealand Mail* furnishes the following notes on the above subject:—

It is always as well to have a clear idea as to what the consuming end of the trade has when dealing with any commodity, and in presenting this description of how wool is dealt with by Bradford sorters, growers will be able to follow more intelligently and more correctly estimate the different parts of their shorn fleeces.

Wool-classing we define to dealing with the fleece as a whole. There need be no hard and fast rules made, as fleeces show up very differently, and when they are straight and uniform they do not demand that classing and skirting as do fleeces that are "ragged" and wanting in uniformity. In classing it is usual to make three sorts of combings, also a cast, and two if not three sorts of clothing. In the combings the great bulk will consist of first combing, being an average quality and length of the whole clip, and it must be even and sound. Super-combing when made consists of parts of fleeces that usually are a little shorter than the first, but much finer, quality here being the chief desideratum. The second combing should contain much longer, stronger, and deep-grown wool than the first combing, and consist of nothing but sound wool. The cast should include all cross and very low fleeces which do not near approach the general run of the whole flock. In clothing the classes should be made according to quality, and are usually made independent of length. Super-clothing consists of the highest quality, the staple being shorter than the combing, with good colour, density, fine serrations, well fitted for felting purposes, and soft and kind to the touch. First clothing contains the bulk of the shorter wool, providing it is clean and free, is usually a little longer than the super, and not so fine, but due attention should be paid to brightness, softness and elasticity. Second combing, when made, is composed of a very wide grade of wool, but when super and first combing are made there need be no second clothing attempted only when a big

clip is to be classed, or when the super is knocked off there should then be a first and second clothing, circumstances determining the line of action at the time being. We rather incline to lean to the line of action that when second clothing cannot be properly made the wool should go to the pieces. Generally this sort is of much bolder growth than the other two sorts, and always sells on a par with the other parts of the fleece. These past few years good shafty pieces have been in much request, and sold very well indeed.

Let us now look at the expressions one hears every day among Bradford woolmen, and see what they mean. The word combing really means long wool, a term used to distinguish from short wool; a wool specially adapted to the worsted trade Clothing, a short wool; a term used to distinguish from combing or long wool, a wool used in the cloth or woollen trade round Leeds, Dewsbury and Huddersfield. Teg, hog or hogget. The first fleece from a sheep that has not been shorn as a lamb. Shurled hogget, first fleece from a sheep after it has been shorn as a lamb. Wether wool (English), all fleeces cut from sheep after first or hogget fleece has been removed. Wether wool (colonial), all fleeces shorn from unsexed sheep after the hogget fleece has been removed. Brightness refers to demi-lustre, a soft shade of lustre. Fineness: smallness of fibre. Quality signifies fineness with high character of breeding. Silkiness: a combination of softness, fineness and brightness. Broad or thick-haired: denoting loss of character, straight fibred, devoid of elasticity. Hardness: dry, unkind feel. Stringy: thin, delicate-stapled wool. Mushy: open and fuzzy. Noily: wasty, mushy, and the staple usually being starved and perished. Discoloured: stained by dead yolk. Cast: a rough, coarse, bad-bred fleece. Cot: a matted or felted wool. Kemps: white brittle hairs; a fibre grown on sheep, which cannot possibly be dyed, and is always either an indication of want of purity of breed or put down to a bad class of low and coarse-bred sheep. Dags: matted fibres, dirt and wasty matter of all character.

In presenting these technical descriptions of wool, readers will be able to understand and value them at their proper worth, and those growers to whom they refer connot do better than carry them out carefully and systematically when preparing their wool for market. With the vastly increased quantity of wool now thrown on the market growers can no longer skip and scamp their wool klip, and the observation of a lifetime leads one to say that there is nothing more satisfactory in the eye of a buyer than to see a good clip, and that wool nicely done up.

Merino Ram, President.

A contributor to the *Sydney Mail* writes: "One of the sights of the recent Campbelltown Show, Tasmania, was the old ram President. The old fellow is still a grand ram, carrying a fleece little inferior to that of the year in which he was sold, whilst, if anything, he carries himself with greater hauteur. This is not to be wondered at, since he could boast of having over 120 of his offspring at the show. How well the offspring upheld the honour of their chieftain can be gleaned from the following digest of the positions they held in the prize list. To them fell two champions, two reserve champions, two special, ten first, nine second, seven third, five fourth and five fifth prizes. This is a record that, as far as I know, no other stud ram has yet shown."

Trapping Wolves.

H. T. Fuchs, an Angora goat raiser of Texas, and an occasional correspondent of this paper, tells the *Texas Stock Journal* that the principal enemy of the goat in his section is the wolf. He guards against them by the use of proper wire fencing. If the wolves scratch under the fence he sets three steel traps fastened to each other, but to nothing else, and catches the wolves. If the trap is made fast the wolf will break loose, but the weight of three traps fastened together simply tires the wolf out and it rarely drags them more than 200 or 300 yards.—*Rural North-West.*

CORRESPONDENCE.

Successful Grafting of European Olive upon the Native *Olea verrucosa* Link (*Olyvenhout*).

In July 1885 I grafted from scions of the Grosso Nero Italian olive which you sent me on stocks of our wild Black Olyvenhout. I was only successful in saving one young grafted tree. It has blossomed last month and now has the young fruit showing nicely. The tree is standing in pot clay soil. In August 1890 I transplanted the tree as it got burnt by a veld fire, and this very likely put it back, or it would have borne earlier. I would not trouble to tell about this olive tree but I remember that you said it was uncertain if it would bear fruit.

C. M. J. Adams.

Homewood, Blanco, 20th December, 1900.

Successful Use of Locust Screens.

Some years ago, when the Tarka district was overrun by voetgangers, I tried several methods, only two of which proved successful; crushing with flocks of sheep, and, what I recommend as better, the use of screens and pits, with which I destroyed 13 large swarms. One of the most important things is to keep the locusts from eating the screens of calico; to prevent this, soak the stuff well in a strong solution of tobacco extract and Cooper's Dip.

Where each screen ends at the mouth of the pit, place a strip of packing case tin lining at such an angle that the insects will slip into the pit when trying to cross. When making the pit, great care should be taken in regard to the shape of its mouth. It should always be square and the outside hollowed out similar to the Natives' grain pits, like an inverted funnel; this keeps the locusts from crawling out. When the pit is full enough, fill well with earth and beat it down. If any difficulty be found in getting the swarm to the screen put a flock of sheep over the edge of the swarm, which causes them to fall back in any direction required, always having boys on the flanks of the swarm with large white flags on long sticks.

The top edges of each screen must have a border of not less than four inches of table oil-cloth to prevent the locusts getting over.

S. J. Jakins.

Tarka, November 11th.

The use of screens and pits is well known in Cyprus, South America, and other countries which suffer from locust depredations.—Ed.

Show Fixtures.

*Elliot Agricultural Society, April 10th, 1901.
Indwe Native Agricultural Society, March 1901
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.
Western Province, Rosebank, 21st and 22nd February, 1901.

* The Elliot Agricultural Society has decided not to hold any Show this year.

GOVERNMENT NOTICES.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV., and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Government School of Agriculture,

ELSENBURG, VIA MULDER'S VLEI, NEAR STELLENBOSCH.

The next Session will commence on the 1st February, 1901.

Practical and theoretical instruction is given in all branches of farming.

A farm of 850 morgen is attached to the school.

A few Bursaries of the value of £25 per annum each are open to sons of parents not good circumstances.

For prospectus and particulars apply to the Principal, Elsenburg, via Mulder's Vlei.

Rietti Seed Wheat.

In connection with the reports published in the *Journal* of the 20th ultimo [No. 13, vol. xvii., p. 783] upon experimental sowings of Rietti Wheat, and with reference to the remarks made by Mr. Visser concerning the rust-resisting qualities of this variety of wheat [see p. 758 of *Agricultural Journal* No. 12, vol. xvii.]; endeavours were made by the Government to procure a supply of fresh seed from Europe, for further trial.

As at present advised, however, only a small consignment can be obtained, which will be landed in a few days' time; and it has been decided to issue this wheat to applicants on the usual terms, viz: No more than 100 lb. to be issued to any one person; the recipient to pay a deposit at the rate of 10. per 100lb., which deposit will be refunded to him upon receipt of his report, in due course, upon a printed form supplied by the Agricultural Department, as to the result of the experimental sowing. The cost of railway and other transport from Cape Town must be borne by the applicant.

As the quantity of seed available for distribution is very limited, applications must be sent in not later than the 18th FEBRUARY, 1901, and must be addressed to the Under Secretary for Agriculture, Grave Street, Cape Town.

Lung-Sickness.

NTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last :—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pieuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..........................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.
(Inspector's Signature..
(Address)..
Date....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent......................
(Inspector's signature)..
(Address)..
Date..................

Notice to Fruit-growers.

The Board of Horticulture, having deputed Mr. P. J. Cillie to visit during this season the Western Fruit Districts, with a view to framing a list of varieties suitable for cultivation in the different parts, hereby invite the assistance and co-operation of fruit-growers by affording Mr. Cillie every facility and supplying him with the desired information.

C. MAYER, Acting Secretary.

Medeah Seed Wheat.

The attention of wheat-growers is drawn to a small consignment of Medeah Seed Wheat (the balance of a quantity ordered in 1897) which has just been received from Europe and is now available for experimental sowing.

Our readers may be reminded that, as more fully set forth in the statement published in the *Agricultural Journal* (No. 4 Vol. XI. of 17th August, 1899), the result of 27 trial sowings of this wheat, distributed over 23 districts, shows that it has good rust-resisting qualities. In 13 cases there were no signs of rust, in 4 there was but a slight touch, and in 9 the amount was small and did not appreciably affect the yield and the wheat compared favourably with other varieties sown in the same locality. The yield varied from 250 lb. to 2,188 lb., —the average being 1,134 lb. for every 100 lb. sown.

Further reports which have been received, regarding a few trial sowings in 1899, show the same rust-resisting qualities. Of 6 trial sowings, no rust appeared in 5, the sixth having been killed by drought; and the yield averaged about 1,400 lb. for every 130 lb. sown.

Albert, Barkly East, Wodehouse, Bedford, Tarka, Humansdorp, Robert on, Caledon, Vryburg and Xalanga Districts gave the best returns.

The wheat will be distributed, for experimental sowing, under the following conditions:—Not more than 100 lb. to any one person; the recipient must pay a deposit at the rate af 10s. per 100 lb., which deposit will be refunded to him upon his furnishing a full report, upon a printed form to be supplied by the Agricultural Department, regarding the growth, mode of cultivation and yield of the seed sown.

COST OF RAILWAY OR OTHER TRANSPORT FROM CAPE TOWN MUST BE PAID BY THE APPLICANT.

As the quantity available for distribution is limited, applications must be sent in not later than 31st December, 1900, and addressed to the Under Secretary for Agriculture, Grave Street, Cape Town.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday last, the 12th January, 1901, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

ARTICLE.	Aliwal North.	Beau-fort West	Bloem-fontein.	Burg-hers-dorp.	Cape Town	Clan-william.	Coles-berg.	Cradock	Dor-drecht.	East London.	Graaff-Reinet	Grahm's Town.
	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d	£ s. d.	£ s d	£ s d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
A. WHEAT, per 100 lbs.	0 10 6	0 13 6	...	...	0 10 0	...	...	...	...	0 12 6	0 12 6	...
B. WHEAT FLOUR, per 100 lbs.	1 0 0	1 5 0	...	0 15 0	0 13 9	...	...	...	...	0 18 6	0 17 6	...
C. BOER MEAL " "	0 12 6	0 16 6	...	...	0 11 0	...	...	...	...	0 17 6	0 14 0	...
D. MEALIES " "	0 12 6	0 15 0	...	0 13 0	0 10 0	...	...	...	...	0 9 0	0 12 0	..
E. MEALIE MEAL " "	0 14 0	...	...	...	0 9 6	...	...	...	...	0 9 9	..	...
F. BARLEY " "	0 17 0	0 17 0	...	0 13 0	0 10 0	...	...	...	...	0 15 9	0 12 0	...
G. OATS " " ...	1 0 0	..	...	...	0 10 10	...	...	...	...	0 18 0	0 12 0	...
H. OAT-HAY " "	0 18 0	0 12 6	...	0 16 8	0 8 9	...	0 13 0	...	...	0 14 0	0 12 0	...
J. POTATOES, per bag	1 2 0	1 5 0	...	...	0 13 0	...	...	...	...	0 15 9	1 2 6	...
K. TOBACCO (Boer Roll) per lb.	0 1 2	0 1 0	...	...	0 0 10	...	...	...	...	0 1 6	0 1 0	...
L. BEEF, per lb.	0 0 10	0 0 9	...	...	0 0 6½	...	...	...	...	0 1 0	0 0 8	...
M. MUTTON, per lb.	0 0 10	0 0 7	...	...	0 0 7½	...	0 0 9	...	...	0 1 0	0 0 7	...
N. FRESH BUTTER, per lb	0 1 3	0 2 0	...	0 0 9	0 1 6	...	0 1 3	...	...	0 1 9	0 1 6	...
O. EGGS, per dozen	0 2 0	0 2 0	...	0 2 0	0 2 6	...	0 2 3	...	...	0 2 3	0 1 9	...
P. CATTLE (Slaughter)...	18 0 0	18 10 0	...	...	17 0 0	...	...	...	...	23 0 0	14 15 0	...
Q. SHEEP "	1 1 2	1 1 6	...	...	1 4 0	...	1 0 0	...	...	1 6 9	1 6 3	...

CURRENT RATES OF AGRICULTURAL PRODUCE—(continued).

ARTICLE.	Johannesburg.	Kimberley.	King Willm's Town.	Malmesbury.	Mossel Bay.	Pietermaritzburg, Natal.	Port Alfred.	Port Elizabeth.	Queen's Town.	Tarkastad.	Vryburg	Worcester.
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.	£ s. d.
A WHEAT, per 100 lbs	...	0 13 0	...	...	0 12 0	...	...	...	0 12 3	...	...	...
B. WHEAT FLOUR, per 100 lbs	...	0 16 0	...	...	0 17 0	...	...	...	0 17 9	...	...	...
C. BOER MEAL „	...	0 15 6	...	...	0 12 0	...	...	...	0 14 0	...	...	...
D. MEALIES „ „	...	0 13 0	...	...	0 10 0	...	...	...	0 13 3	...	...	...
E. MEALIE MEAL „ „	...	0 12 6	...	...	...	...	...	...	0 12 3	...	...	...
F. BARLEY „ „	...	0 11 0	...	...	0 7 6	...	...	0 9 6	0 15 0	...	...	...
G. OATS „ „	...	0 15 6	...	..	0 15 0	...	...	...	0 13 6	...	...	...
H. OAT-HAY „ „	...	0 12 0	...	..	0 10 0	...	0 6 6	0 7 6	0 12 6	...	..	...
J. POTATOES, per bag	...	1 4 0	...	...	0 12 0	...	0 14 0	1 0 0	0 15 0	...	...	...
K TOBACCO (Boer Roll) per lb.	...	0 1 0	...	...	0 1 0	..	...	...	0 2 6	...	...	...
L. BEEF, per lb.	...	0 0 10	...	...	0 0 10	...	0 0 9	...	0 0 9	...	...	...
M. MUTTON, per lb.	...	0 0 9	...	...	0 0 10	...	0 0 10½	...	0 0 9	...	...	...
N. FRESH BUTTER, per lb.	...	0 2 0	...	...	0 2 0	...	0 2 0	0 1 9	0 1 0	...	...	...
O. EGGS, per dozen	...	0 3 0	...	...	0 1 6	...	0 1 1	0 2 0	0 1 6	...	...	...
P. CATTLE (Slaughter)...	...	18 0 0	...	..	...	...	...	...	...	...	...	...
Q. SHEEP „	...	1 1 6	...	...	...	...	...	...	...	...	..	...

NOTE.—No Returns were received from Clanwilliam, Cradock, Dordrecht, Graham's Town, King William's Town, Malmesbury, Tarkastad and Worcester.

THE

Agricultural Journal

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AGRICULTURE.

Reports and Prospects.

East London.—BRAAKFONTEIN, *Dec. 31st.*—Magnificent rains fell during the month, and it is showery whilst writing. Our rivers have been up bank high, giving the much desired scouring. Spruits and streams are running, vleys are partly filled, and fountains have much strengthened; in fact, such a downpour has not been experienced for many years. Ploughing is being carried on on all sides, and appa-

rently every advantage is being taken for getting in crops, mainly mealies. The general outlook is most promising, pasturage is abundant, and standing crops coming on strongly. A swarm of winged locusts put in an appearance on 27th-28th and continue with us. Up to the present their depredations have not been great. Farmers are busy reaping wheat and oats where anything like fit. A few lands of young mealies that have been eaten out can if necessary be reploughed, as the season is not as yet too far advanced for this grain. I have not yet observed the locusts' natural enemy, the maggot, but trust it may develop and carry on the work of destruction amongst these terrible pests. Stock are in good condition, both cattle and goats. Lungsickness, I regret, has again cropped up, but I trust from the precautionary measures taken it may be confined to the area quarantined. Garden produce is fairly plentiful; potatoes, where fresh seed has been used, promise fairly. Pumpkins and beans also show well. Some slight damage has been done in the washing away of cultivated land, but more than counteracted by the much-desired rain. Fruit, such as apples and late peaches, promise good returns. It is noticeable in this part the freedom from peach-maggot in the November or early peach, and one can but wish the same good fortune for the coming or St. Helena yellow peach. Truly the old year closes with a bright prospect of the new, barring locusts.—W. Ellis. Ward 6, *Jan. 1st*.—Good rains have fallen during the past month, and everything has a bright look now. Water is again plentiful. Stock has picked up in condition, and there is every prospect of a good crop of mealies. Kaffir corn is very good, and also root crops have greatly improved since the rains. Of other cereal crops there is very little, they have been mostly destroyed by locusts, but I am glad to state that the insects have disappeared from here. The season for beans has just commenced, and farmers are busy planting them.—W. Kretzmann. Ward No. 3, *Jan. 7th*.—Good soaking rains have fallen and there is consequently a luxuriant growth of vegetation. The mealie crop is promising, but Kaffir corn is not showing up as well as anticipated owing to the grub that invariably attacks this plant about six or eight weeks after sowing. The large flying locusts are with us again, but up to the present the swarms are small and have not done serious damage. There will be a considerable shortfall in the apple and plum crops owing mainly to the black and yellow beetle, which periodically attacks the flowers of beans and other plants. Stock are healthy and in good condition.—T. Willows. Ward 2, *Dec. 31st*.—We have had splendid rains during the month and the crops that are in look promising, excepting the early ones of Kaffir corn and mealies, which are badly infected with grub. The veld is in splendid condition. A case of miltziekte occurred during the month, otherwise cattle healthy and in good condition. Locusts have all disappeared from this Ward—E. Holdstock. Ward 1, *Dec. 31st*.—The drought has disappeared. Heavy rain fell during the night of the 4th and continued on and off three days. About 2½

inches of rain fell here, caught in an oil can in an exposed situation in my garden. Rain commenced again cn the 18th and lasted on and off all the week. The oil can was absent, but I guess three inches of rain came down during the week, and the Chalumna has also come down for the first time since the rinderpest three and a half years ago. The country is green everywhere. I have had no time for riding about and can only guess that farmers are making best use of the opportunity. Stock should now fatten quickly.

T. WARREN.

Potato Spraying.

A correspondent of the *Belfast Weekly News* gives the following particulars relative to the advantage of potato spraying, which may possibly prove interesting to our readers :—

"The distance in each case was 20 yards in a 24-inch drill.

			Large. lb.	Small. lb.	Tl. lb.
Suttons,	not sprayed	... ...	23	31	54
,,	twice ,,	... ...	41	27	68
White Skerries	once ,,	.. ...	44	25	69
,,	twice ,,	... ...	50	23	73
Black ,,	not ,,	... ...	18	21	39
,, ,,	once ,,	... ...	33	19	52
,, ,,	twice ,,	... ...	50	18	68

It will be seen from the case of the black skerries that the second spraying gave even a better result comparatively than the first. It is also worth noticing that there was a considerable decrease in the growth of weeds, due no doubt to the foliage remaining on so much longer. Altogether, I have found that the results will repay the trouble."

Experiments on Wheat Manures.

During the past season a series of experiments has been conducted at the Government School of Agriculture, Elsenberg, to test the action of different manures upon the wheat crop. The fertilisers used were such as are now commonly applied in the Colony, though the quantities in certain instances were somewhat greater than would be given in ordinary practice.

The soil, which was trenched, previous to sowing, to a depth of about fifteen inches, was of granite formation. It was of a sandy gritty nature and rested on a clay subsoil.

The variety of wheat sown was Du Toit's, and it was distributed at the rate of one bushel to the acre.

The fertilizers were, with the exception of Nitrate of Soda, applied at the same time as the seed; whilst the Nitrate was added as a top dressing when the young wheat had reached a height of about four inches.

The "mixed special" manures were obtained direct from the different firms and are mostly described as "wheat fertilizers." A large number of merchants were invited to forward a small quantity of their "special" manure, for the purpose of testing its value in use, but only six samples were actually received.

Manure.	Quantity per Acre.	Straw and Chaff per Acre.	Grain per Acre.	Total Yield per Acre.
1. Superphosphate ..	2 cwts.	1,360 lb.	416 lb.	1,776 lb.
2. Superphosphate ..	2 ,,	2,096 ,,	736 ,,	2,832 ,,
Nitrate of Soda ..	1 ,,	...	...	...
3. Superphosphate ..	2 ,,	992 ,,	288 ,,	1,280 ,,
Nitrate of Soda ..	1 ,,	...	...	..
Kainit ..	2 ,,	...	...	...
4. Kainit ..	2 ,,	...	...	..
Nitrate of Soda ..	1 ,,	2,288 ,,	736 ,,	3,024 ,,
5. Nitrate of Soda ..	1 ,,	2,512 ,,	864 ,,	3,376 ,,
6. Basic Slag ..	2 ,,	1,792 ,,	736 ,,	2,528 ,,
7. Basic Slag ..	2 ,,	2,112 ,,	624 ,,	2,736 ,,
Sulphate of Ammonia	$\frac{3}{4}$,,	...	...	..
8. Muriate of Potash	$\frac{1}{2}$,,	1,008 ,,	640 ,,	1,648 ,,
9. Dissolved Bones ..	2 ,,	2,080 ,,	784 ,,	2,864 ,,
10. Government Guano	2 ,,	2,048 ,,	768 ,,	2,816 ,,
11. Stable Manure ...	16 tons	2,432 ,,	832 ,,	3,264 ,,
12. Sheep Kraal Manure	16 ,,	1,888 ,,	480 ,,	2,368 ,,
13. Stable Manure ...	16 ,,			
Superphosphate ..	2 cwts.	Entire	Failure.	
Nitrate of Soda ...	1 ,,			
Kainit ..	1 ,,			
14. *No Manure* ...	—	1,136 ,,	576 ,,	1,712 ,,
15. Superphosphate ...	80 lb.	...	...	..
Kainit ..	80 ,,	3,168 ,,	928 ,,	4,096 ,,
Nitrate of Soda ..	40 ,,			
16. Superphosphate ...	3 cwts.	Entire	Failure.	
Kainit ...	3 ,,			
Nitrate of Soda ..	$1\frac{1}{2}$,,			
17. Sulphate of Ammonia ..	$\frac{3}{4}$,,	1,280 ,,	X	X

X.—Grain was accidentally tampered with.—W.M.

"SPECIAL" ARTIFICIAL FERTILIZERS.

1	250 lb.	2,640 lb.	960 lb.	3,600 lb.
2	,,	1,872 ,,	656 ,,	2,528 ,,
3	,,	1,952 ,,	576 ,,	2,528 ,,
4	,,	992 ,,	312 ,,	1,304 ,,
5	,,	Failure.		..
6	,,	1,600 ,,	562 ,,	2,162 ,,

It is well that we should grasp at the outset that what is true in respect to one district may in no way apply to soils of a different formation, in another part of the country, and also that the results obtained from one year's experiments cannot be taken as final. To obtain really trustworthy and valuable results requires that the same investigations should be carried on, not only in different places, but that they should be continued for a number of years, and the average of the results obtained may then be taken as a very near approximation to the truth.

With these reservations the following deductions appear to be warranted :—

1. A general manure is of great value when used in moderation.

2. Any additional quantity of manure beyond a certain very moderate amount not only fails to give a corresponding increase in the yield, but actually exerts a deleterious influence upon the crop.

3. That Potash manures—either in the form of Kainit or Muriate of Potash—fail to give any good result, and so far as the tests go, it would appear that they diminish the return when used either alone or in conjunction with nitrogenous or phosphatic fertilizers.

4. That nitrogenous manures—especially Nitrate of Soda—yield beneficial and satisfactory returns.

5. The unreliability of so-called "special" wheat or grain fertilizers.

The plant foods which are most commonly lacking in soil are Phosphoric Acid, Potash, Nitrogen and Lime, and a "general" manure is one which aims at supplying all these constituents.

Of the five plots yielding a total of over three thousand pounds per acre, three received a general manuring (No. 1 Special is described as a fertilizer containing Nitrogen, Phosphoric Acid and Nitrogen), whilst the returns from the other two are entirely attributable to the stimulating action of Nitrate of Soda.

As would naturally be expected, the ordinary stable manure, not having been subjected to the same amount of washing, proved superior to that obtained from the sheep kraal, but the failure of the plot receiving stable manure and artificials comes as a surprise.

Now, though the produce of the plots receiving complete manures has been satisfactory it would seem that, were we to eliminate Potash from the mixture, we would be able to obtain as good or even a better result. The data obtained, however, do not altogether justify the statement that such would be the case, though they certainly point in that direction.

The *amount of manure* which can be used per acre and yield a satisfactory return appears to be a very moderate quantity indeed. In Europe 7 or 8 cwts. of artificials could with safety be applied, but here such applications have entirely destroyed the crop. Thus of a mixture of Superphosphate, Kainit and Nitrate of Soda 200 lb., 500 lb. and 750 lb. were respectively applied; the 200 lb. gave the

greatest total weight of any plot experimented upon, the 500 lb. gave less than the unmanured plot, whilst the 750 lb. yielded no return at all. Again, 16 tons of farmyard manure when used alone gave a favourable return, but when augmented by a mixture of artificials there was no crop whatsoever.

It is worthy of note that all the plots which received the heaviest manuring came away the best at the commencement of the season, but immediately the dry weather set in they began to flag and look sickly, and, ultimately, they withered away. The probable explanation of this observation would be, that immediately rapid evaporation sets in, the soluble salts in the soil are drawn by capillary action into the surface layers, where they accumulate to such an extent as to become positively poisonous to the plant. Such a result is decidedly important as it tends to show the futility of anything like "high" farming in this district. The law of diminishing utility comes into play long before we can produce a full crop, and the question arises "Can we make wheat growing pay under these circumstances?"

The *failure of the Potash manures* is most marked. Muriate of Potash when used alone failed to produce any total increase, though the proportion of grain to straw was somewhat altered. Kainit when mixed with Nitrate of Soda gave a smaller produce than when a similar quantity of Nitrate of Soda was used by itself, while the Superphosphate and Nitrate of Soda plot gave over double the return of what was obtained when the two were supplemented with Kainit, at the rate of 2 cwts. per acre.

It is thus interesting to note that a recognised plant food not only failed to give an increase, but apparently retarded the growth of the crop. The failure to increase the yield could, as we shall see later, have been predicted from the analysis, and the injurious effect of this ingredient of plant food has occasionally been noticed in other countries.

The *addition of nitrogenous manures* has in all normal cases given satisfactory additions to the crop. Nitrate of Soda, which is a purely nitrogenous manure, gives the largest increase. Sulphate of Ammonia when used with Basic Slag gives a larger yield than does the Basic Slag alone, though the extra produce is entirely in the straw. Dissolved Bones of Colonial manufacture (The Cape Chemical Syndicate, Ltd.) give a slightly better result than does the Government Guano. Stable and Sheep Kraal manure have both produced suitable returns.

The results obtained by the application of "special" fertilizers vary considerably. No. 1, which was supplied by Messrs. Malcomess & Co., of East London, would appear to be a high class manure and comes out well ahead of all others.

The purchase of these specially compounded fertilizers must at best be a very risky business and is a practice not generally to be recommended. When an investment in such article is made it should always be with a trustworthy firm, and a guaranteed analysis should in all cases be insisted upon. Such compounded fertilizers offer far

too tempting a field for adulteration and fraud to be indiscriminately purchased. In fact with all manure it is advisable to insist upon a guarantee before buying. In this connection I should recommend that the Government Guano should be supplied upon guaranteed analysis. No doubt this product varies somewhat in composition, but it is only fair to the farmer to inform him what he is buying, and what variations he may expect to find. If only by way of example to manure merchants I would urge that this suggestion should be adopted.

The soil on which these tests were carried out was at my request analysed in the Government Analytical Laboratory by the "Dyer" method, *i.e.*, by a 1 per cent. solution of citric acid, and in this manner the amounts of soluble potash and phosphoric acid were obtained. Dr. Dyer recommends that when a soil has less than .01 per cent. of phosphoric acid it should have an application of phosphatic manure, and that if more than .01 per cent. of potash is present there will be no need to apply a potassic fertilizer. It is interesting to note how the results of these experiments have borne out his conclusions. The report of the analyst is appended. No. 1 is the soil referred to, No. 2 has no connection with these experiments.

The experimental results do but show the necessity for further investigation. Their worth lies more in the indication which they give of the direction future research ought to take, than in their inherent value, and it would appear desirable that further research should be made and that such investigation should be carried out on a broader and more extended scale. W.E.M.

The following is a report on the analysis of two samples of soil, from Elsenberg, submitted by the Principal of the Agricultural College.

The following were the samples submitted :—

No. 1. Average of two samples taken from field at Elsenberg.
No. 2. Sample of soil from orchard, Elsenberg.

The analytical results are as follows :—

No.	Moisture.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
1	·949	2·074	·0085	·056	·065	·024	·024
2	·626	2·254	·0106	·056	·044	·024	·050

The Lime, Potash and Phosphoric Oxide were determined in the "Fine Earth" obtained by sifting the soils through a sieve with meshes ½ mm. in diameter. Of this "Fine Earth" No. 1 contained 80.2 per cent. and No. 2, 57.7 per cent. The other constituents were determined in the product obtained by sifting the soils through a 1 mm. sieve.

Referring the determinations of Lime, Potash and Phosphoric Oxide to the original soils the following figures are obtained:—

No.	Lime.	Potash.	Phosphoric Oxide.
1	·052	·020	·020
2	·025	·014	·029

The above percentages of Lime and Potash represent the amounts of these constituents extracted from the soil by digestion for (5) five days with Hydrochloric Acid of specific gravity 1.115. The percentage of Phosphoric Oxide represents the total quantity of this constituent present in the soil.

In addition to the above, determinations were made of the amount of readily available Phosphoric Oxide in soil No. 1, and also of the percentages of Potash and Phosphoric Oxide extracted by the solution recommended by Dyer (1 per cent. Citric Acid solution, left in contact with the soil for (7) seven days).

The following figures were obtained:—

Readily Available Phosphoric Oxide.	Dyer's Method.	
	Potash.	Phosphoric Oxide.
·0013 per cent.	·017 per cent.	·0036 per cent.

The results are calculated on the original dry soil.

Owing to difficulty in obtaining the necessary re-agents, it was not possible to determine the total Lime and Potash in the sample.

A. J. J. B. Simons, Analyst.

Government Analytical Laboratory,
Cape Town, 29th Dec., 1900.

Precautions in the Use of Artificial Manures.

The following advice is taken from the *Agricultural Gazette* of New South Wales:—

1. When purchasing a manure always insist on a guarantee of its composition as determined by analysis.

2. It is, as a rule, better to purchase simple manures, and to mix them yourself in the proportions requisite for the particular case, rather than to buy complete fertilisers ready mixed. In the first place, the simple products are much less liable to adulteration, and

the adulteration is much more readily detected; in the second place, you will avoid purchasing and paying for an excessive quantity of an ingredient which may not be required in the particular case for which you are using it; and, in the third place, you save the cost of mixing. As these artificials are seldom required in greater quantities than can be easily mixed by hand, the trouble involved is very small. The simple manures are:—Bonedust and superphosphates, containing phosphoric acid and nitrogen; dried blood and sulphate of ammonia, containing principally nitrogen; kainit, sulphate of potash, and wood ashes, containing potash; lime, gypsum, etc., containing lime.

3. Soluble manures are best applied when the plant is above ground.

4. All artificial manures should be mixed with about three times their weight of dry loam, and distributed evenly.

5. Soluble manures should be used with caution on very porous soils.

6. Soluble manures are applied superficially; and the insoluble manures can be harrowed in lightly.

7. They should be used in conjunction with farmyard manures, as a rule.

8. Never add lime to a manure containing nitrogen; and when lime has been applied to the land, do not use such manures until about three weeks afterwards.

9. The depth for applying the insoluble manures will be regulated to some extent by the root of the crop, but, as a rule, it is not advisable to manure to too great a depth.

Science in Agriculture.

Its Value to Farmers When Properly Understood.

The following article on the value of science in farming operations is from the pen of the Melbourne *Weekly Times'* agricultural editor:—

"In the management of a farm, whether large or small, it is essential that the system pursued should be founded on a sound basis, or otherwise the land will soon become deteriorated. The system adopted should be founded on the experience of the farmer, combined with a good general knowledge of the main principles of agriculture. A farmer who is likely to succeed best is one that is a careful observer in his own practice, and who is anxious to obtain sound information from others. Practice helps to make perfect, and there are many things which farmers have to find out by hard experience which they cannot learn in any other way. Science, however, will materially aid the observant and thoughtful farmer in turning his land to the best advantage. It, however, requires some

intelligence to apply its teachings in a thoroughly effective manner. The teachings of agricultural science are too often despised or ignored by farmers, because they do not understand them, or are unable to apply them in their practice.

Scientific is not Fancy Farming.—There are a goodly number of farmers who look upon science as applied to the raising of crops as meaning nothing more than fancy farming, which, if followed, will result in failure. This feeling is, no doubt, materially strengthened by the number of theoretic articles, supposed to be based upon scientific knowledge, that appear in some books on agriculture, but which, when examined carefully by the light of long practice, are found to be misleading and valueless. Science, however, should not be despised on this account, as it stands upon a sound foundation, and its teachings cannot be controverted, though they are not always understood. Mistakes are sometimes made by the most careful and observant men, owing to some disturbing element in their calculations that has not been considered; but, on the other hand, those who combine sound theoretical knowledge with practical skill will generally prove the most successful farmers. The farmer who has the best chance of success is the one who has both a sound, practical, and a theoretical knowledge of agriculture. Science teaches us certain truths, and practice enables us to apply them most effectually.

Allow for Local Conditions.—Agricultural scientists know that their facts are incontrovertible, and are apt to assume that their teachings are all-important, and that they have only to be followed to the letter to ensure success. They are too fond of laying down precise formulas to be followed by farmers, without making due allowance for disturbing elements caused by peculiar local conditions. Now, it should be clearly understood that no code of rules laid down by teachers of agricultural science will relieve farmers from the responsibility of deciding for themselves many questions that will arise in practice. Though science teaches many important things, a knowledge of which is of immense service to the farmer, yet their application can only be carried out effectively by the practical man. The details of practice which are found to be admirably suited to the wants of one farmer may be quite unsuited to the requirements of another, whose operations are carried on under different local conditions.

Agricultural Experience Necessary.—It should be clearly understood by both scientific and practical men that science alone will not ensure success in the management of a farm, and that agricultural experience is equally necessary. Scientific formulas in relation to the cultivation of the soil cannot be generally applied in the same way as if the conditions of farming practice were fixed. In every agricultural problem there will be a scientific and a practical bearing, and the latter will often require the most consideration. The practice on each farm must be adapted to the climate, soil, and other conditions, also to the nature of the crops grown, and no general rules

can be laid down unless they are based on experience. The farmer cannot be guided absolutely by rules laid down by others, even when based upon the soundest principles, and though he may be aided materially by the teachings of science, he must find out by practice what system is best adapted for his special requirements. A man possessing merely the practical skill of an intelligent farmer may be able to carry on operations with a fair amount of success, but he will be in a much better position if he has some acquaintance with the scientific principles of agriculture. The purely scientific man, on the other hand, cannot reduce the principles to practice with certainty unless he possesses a sufficient amount of practical knowledge to enable him to make allowances for disturbing local elements.

What is Wanted.—The scientific knowledge required by farmers is that which will enable them to thoroughly understand the nature of the land they have to deal with, and what treatment it wants to make it yield the most satisfactory returns without becoming exhausted by cropping. It is also necessary to possess a good knowledge of the requirements of the crops, and what materials each one extracts from the soil for its support. Crops vary materially in their requirements in this respect, and every good farmer knows that by adopting a judicious system of rotation the drain upon the land is much less than if the same kind of crop is grown year after year without intermission.

Without the aid of science a farmer will soon learn by practical experience that his land can become exhausted by continuous cropping with the same family; but it requires some little knowledge to enable him to avoid the error or to remedy the mistake afterwards in the most simple and economic way. By judicious management in cultivating, land may be kept in a productive state without deteriorating for an unlimited period, but it must be treated rationally, and according to the principles laid down in agricultural science. Every crop that is removed takes so much material from the soil, and unless an equivalent is returned to it in one form or the other, land must fall off in fertility. The best restorative is undoubtedly manure, and when this can be used freely heavy crops can be obtained continuously, and the land always remains fertile. It is, however, not always practicable to apply manure, and cultivators must endeavour to rest and recuperate the land by a rotation of crops and fallowing.

Some things we may learn.—Science also teaches us that by deeply and thoroughly cultivating the land its fertility is in a great measure conserved, and the crops are grown under the most favourable conditions. When land is only broken up to a slight depth, though the seed may germinate freely, and the plants make strong growth till their roots have spread through the thin layer of soil, the crops must necessarily suffer afterwards. As soon as settled dry weather sets in, the thin layer of soil is rapidly exhausted of its moisture; consequently, growth receives a check, and the crops suffer. Perchance, if the season should happen to be a moist one, the crops will be able

to hold their own till they are well advanced; but, as a rule, this is not the case in this part of the world. Were the soil cultivated a few inches deeper, crops would be far more certain than when grown in shallow worked ground. It will not do, however, to break up land deeply in all cases, and a farmer requires sufficient scientific knowledge to be able to foresee the consequences before he decides.

There are many other matters in connection with the treatment of the land in which some knowledge of the scientific truth of agriculture will be of the utmost service to the farmer. They will also be exceedingly useful to him in the breeding, rearing and feeding of live stock. In all cases, however, the teachings of science can only be applied with certainty by men whose practical experience will teach them to avoid errors, which may upset the calculations of the cultivator."

Farming as a Business.

A correspondent of the *Australian Farm* writes:—

"A great many farmers on being asked what their business is, reply that they have no business—"We are only farmers."

A greater mistake could not be made. Many people seem to think that "business" means selling goods or manufacturing or something of that sort in town, and is a distinction with a difference from farming. But farming is a business. It is pursued with the avowed object of getting a living. It is not a science, but a business.

While farming is a business, all farmers do not have business methods, and this is the cause of so many failures on the farm. A good business man always makes a success of farming, just as he would of any other business. Careful thought and study and business methods always win, no matter what the business is. It is the man that wins and not his calling. There is no business on earth that will win out and become a success without a business man behind it. It is correct habits of thought, correct methods, correct principles, applied to any business that prevents it from being a failure. Failure of a business is not the fault of the business but the fault of the man behind it.

A great many farmers are not good business men. Many of them never studied the first principles of agriculture. Hundreds of them drifted into the business of farming from the ranks of the labourer, having never before assumed business responsibilities. Many of them, having made flat failures of other ventures, drifted into farming without any previous thought about the business. Is it not surprising that there are so few failures on the farm? If as many people would engage in any other kind of business with as little preparation, the percentage of failures would simply be enormous. This is evidence that farming is a good business, and presents opportunities for the business man.

The man who owns or operates a farm is something more than a labourer. It is the business of the labourer to execute previously planned work. It is the duty of the farmer to plan work and operations and methods. If he plans and executes too, he is a business man and a labourer combined. The average farmer does not labour too much, but he plans too little. He uses his hands enough perhaps, but he does not use his head properly. He is not a business man. Some farmers labour so hard that it is impossible to use their reasoning powers properly. This is wrong; they are neglecting the most important part. Only a few men have strength to perform severe physical labour and at the same time think clearly and logically. On the other hand, it does no good to think, to calculate, unless the plans are executed.

One man cannot perform all the labour on even a small farm to make that farm most profitable. Now, if the farmer has business instinct enough in him to properly direct hired labour and his own labour, he can make labour pay, and he can make his business pay also. Farming will then become a business, and a profitable one too."

The Increasing Consumption of Mealies.

A noteworthy feature of our import trade in grain and grain products has been the remarkable increase during the past few years in the supplies of maize. Since 1895 our annual receipts of this product in the form of grain have risen from 33,944,000 cwts. to 62,700,000 cwts., while in the same interval the entries of maize meal have risen from 164,000 cwts. to 1,815,000 cwts. In each of the past four years our imports of the whole grain have exceeded 50,000,000 cwts.; whereas the annual entries prior to 1895, while frequently exceeding 30,000,000 cwts., only twice show an importation of more than 40,000,000 cwts. In 1890 the quantity of maize grain imported was 43,438,000 cwts. The course of these imports for the past twenty-five years may be seen from the quinquennial averages, which are as follows:—1871-75, 19,663,000 cwts.; 1876-80, 37,104,000 cwts.; 1881-85, 27,961,000 cwts.; 1886-90, 33,436,000 cwts.; 1891-95, 32,884,000 cwts.; and 1896-99 (four years), 56,357,000 cwts. The milled product, on the other hand, was, until 1897, always an insignificant item in this trade, but in that year maize meal suddenly figured to the extent of over 1,000,000 cwts., and in the past twelve months the total consignments were almost double that quantity.

The maize imported into this country is used for the most part as feeding stuff for live stock, though some of it is employed in the brewing, distilling, and other industries, and in the manufacture of proprietary foods and confectionery. Its cheapness as compared with other feeding grains has no doubt stimulated the growing

demand for it amongst stock owners, for during the past three or four years the average value of maize grain has been from 6d. to 1s. per cwt. lower than that of the cheap imported feeding barleys.

The chief source of our supplies is the United States, whence we have received in recent years over 60 per cent. of the entire annual importation, and among the remaining purveyors of maize to our markets the principal are Argentina, Roumania and Russia. Canada is also credited with a considerable contribution in the annual Statements of Trade, but the shipments from the Dominion consist almost entirely of grain produced in the United States. From the latter country we received in 1899 direct consignments amounting to over 39,000,000 cwts.; Argentina furnished 7,731,000 cwts.; Roumania, 7,354,000 cwts.; and Russia, 2,640,000 cwts. Practically the whole of the maize meal imported is supplied by the United States.

Maize occupies a larger area than any other crop in the United States, its acreage usually ranging from 75,000,000 to 80,000,000 acres, with a production approaching 2,000,000,000 bushels annually. Of this large production about 90 per cent. is retained for home consumption, and of the remainder over three-fourths is distributed amongst European countries, mainly the United Kingdom, Germany, Netherlands and Denmark; while Canada takes most of the balance.

In the United States, as elsewhere, maize is chiefly utilised as food for stock, especially for pigs, but it also enters largely into human consumption in various forms, and in the southern States maize bread is a popular diet. Other uses to which this grain is put in America include the manufacture of starch, glucose, whisky and alcohol. The quantity of maize annually consumed in the United States in the manufacture of glucose is estimated at 40,000,000 bushels, and practically the whole of the starch of commerce for the entire country is derived exclusively from the same grain. Apart from the grain, the stalk and blades are also valuable as feeding materials and for other purposes, though these portions of the plant are generally left on the field to be burned before the planting of the next crop. The following passage from a report by the Department of Agriculture at Washington presents a concise description of the economic value of maize from an American point of view:—"It is predominantly the characteristic cereal crop of the United States, and its money value is, perhaps, greater than that of any one crop, with the exception of cotton. It has been shown that it is a valuable food for man, and that it is the chief food of the domestic animals of our great country. In addition to this, large quantities of starch are made from it, and also glucose and grape sugar. It not only serves as our food, but also furnishes a part of our drink, in the form of the various grades of Indian corn whisky. In addition to this, it is the source of an immense industry in the manufacture of alcohols, high wines and Cologne spirits. The stalks, which a few years ago were considered an injurious residue, have been found to possess most valuable properties as cattle food. Especially is this true of the outer shells. The inner portion of the stalk—the pith—possesses

remarkable properties as an obturator in the manufacture of battleships. It possesses a high degree of reliance and porosity, and when perforated by a shot or shell it instantly closes the aperture made by the projectile, and thus prevents the entrance of water into the vessel. It also has peculiar properties rendering it suitable for the manufacture of pyroxylin varnishes, gun-cotton and high explosives. By reason of the nature of its construction it is easily nitrated."

In Argentina the cultivation of maize is extending, though at a slower rate of progress than in the case of wheat. According to the Argentine census of 1895 this crop occupied 3,073,000 acres, or 1,093,000 acres more than in 1888, when the total area under maize was estimated at 1,980,000 acres. In 1899 over 1,122,000 tons of maize were shipped from Argentine ports to various countries, of which the principal were the United Kingdom, France, Belgium, Brazil and Germany.

Among European countries the production of maize has found its greatest development in Hungary, Roumania and Italy. In Hungary the crop occupies roughly 6,000,000 acres, and approximately 5,000,000 acres are devoted to its cultivation in both Roumania and Italy. Russia has something over 2,000,000 acres under maize, and France and Austria cultivate 1,400,000 acres and 800,000 acres respectively.

The maize produced in Austria-Hungary is consumed within the Empire, into which there is also a small net annual importation of about two million cwts. of this grain; it is utilised largely for feeding stock, chiefly pigs, and for the manufacture of spirits. Roumania exports about thirteen million cwts. annually, or approximately a third of the crop grown in the country, her principal customers being Belgium, Austria-Hungary and the United Kingdom. After Roumania, Russia is the principal exporting country in Europe, the total production amounting in a fair season to over twenty million cwts., of which on the average of the last five years for which figures are available nearly nine million cwts. have been exported. There is a fluctuating export from Bulgaria varying from one to six million cwts. yearly.

With regard to importing countries, Germany would appear to be the principal maize importer after Great Britain, her annual net receipts amounting to eighteen million cwts. in addition to a home production of 6,900,000 cwts. Denmark, which does not grow maize to any extent, has since 1897 imported a considerable quantity from the United States and Russia, mainly as a cheap feeding stuff for swine, the net importation in that year amounting to 8,357,000 cwts., and in 1898 to 8,387,000 cwts.

The net importation of maize into France has averaged 6,540,000 cwts. in recent years, whilst the quantity grown has amounted to about 14,319,000 cwts. Holland and Belgium are also importers of this grain to the amount of several million cwts. annually.

Kaffir Corn for India.

The British Government has secured from the Kansas Experiment Station a quantity of Kaffir corn for the Punjâb district of India, where after careful cultivation the seed will be distributed if it does well. The awful droughts in India have made necessary a change from the highly nitrogenous foods which have been the principal food crops, as the peas, beans, wheat and pulse in common use will not make crops under the dry conditions which so frequently prevail there. Through the efforts of the United States Department of Agriculture it has been proved that Kaffir corn will make a crop of grain under conditions of dryness that mean the destruction of almost all kindred plants.—*Texas Farm Journal.*

STOCK FARMING.

Angoras in America.

Mr. G. E. Allen in a treatise on the Angora goat, *Starting in the Goat Business*, says:—

"Geo. A. Hoerle, well known as secretary of the American Mohair Growers' Association, and himself an experienced and scientific breeder, is a firm believer in the Angora goat industry in the United States. There are very few states in the Union, says Mr. Hoerle, which have not millions of acres of brushy mountain land of next to no value located from an altitude of 400 to 500 feet above the sea level to 6,000 or 8,000 feet, depending much upon the latitude of the land, which would offer a perfect paradise to the Angora goat, and would if stocked with these animals be a source of ever increasing profit to their owners, and the amount of money which would be required would be so low compared to the profits which could be realized by an intelligent caretaker that the cost usually should not be in the way of anybody who wishes to engage in the enterprise.

The farmer whose farm partly consists of scrub mountain land would have the advantage, and to him Angora goats would be entirely supernumerary, offering the greatest of chances for large profits. All he has to do is to fence a piece of land into two pastures, turn his goats on them alternately, sometimes in one, sometimes in the other; drive them out at daybreak and bring them back at sundown. If possible he should connect the pastures with his

barn, where he should construct an open shed or hovel. Anything that will turn rain would be sufficient. Upon arrival at their roosting place feed them on a little grain, and soon they will not have to be driven in any more, but be there in time for the sweet morsel.

The owner of Angora goats should procure at kidding time two or three suckling pups of some strong breed of dog, but if possible with a strain of collie in them, and raise these three pups on a kidless doe (a common one would be preferable) until they are large enough to follow the goats. Such dogs will become so attached to the breed of their foster mother that they will fight for them until death anything in the shape of four or two-legged curs that would venture near their charge, and be the most reliable of shepherds. Two or three dogs thus brought up with goats could be trusted with the management of a flock of sheep as much as two or three thousand, and with very little extra instruction would herd them as well and with as much sense of duty as any hired shepherd and be far cheaper. I am often asked questions in regard to the cost of goats and whether common goats or Angoras would pay best for a start.

Common goats are not high in price but the item of freight is considerable. This cost may be ascertained from the nearest railroad agent. It is only natural that for goats yielding very heavy fleeces very large prices should have to be paid, and of course also to the above prices the freight would have to be added.

But the Angora goat industry must to-day be considered a very safe and at the same time very profitable investment, provided the personality of the new beginner is suited to it, and if his means are adequate to his own personal demands or those of his family. The land is steadily increasing in value, and his stock is constantly improving. Thus his income as well as his property will steadily increase.

The goat industry promises to furnish a solution of some of the problems which have baffled the best statesmen and sociologists. The utilization of 265,000,000 acres of now worthless land is in itself a proposition which challenges the broadest comprehension. The worn out farms of New England, never noted for superior fertility, afford a rich field for goat raising, and the disheartened descendants of the Puritans may here find profitable and permanent occupation suitable to their impaired means and ambitions.

Scrub lands are especially prevalent in southern localities where the lower negro element is thickest. Goat herding would be an occupation more congenial perhaps to these indolent people than any other, while it might be a valuable factor in their regeneration. While skill is a good thing even in goat raising, it is certain that unskilled labour is more available, and that the influence of the goat upon American social conditions may soon lead us to look upon this animal with appreciation. We may even understand why the goat was an object of worship among many ancient people."

Angora Mutton.

The question as to the age at which Angoras should be turned off for mutton does not cut much figure so long as Angora wethers can be sold for brush-clearing purposes for more than they are worth as mutton. But if there should be a lull in the demand, we believe the wethers should go to market by the time they are five years old, if not before. Their hair gets coarser every year as they get older, and it is the opinion of a good many goat-owners that their flesh is not so good after they are five or six years old as before that time. At five years of age the wethers are very vigorous and make the best brush-destroyers, and can put in a good summer's work in Iowa or Illinois killing brush and then be finished off with a little corn for market. Their meat would then be a prime article and command favourable attention as soon as its merits were discovered.—*Oregon Agriculturist.*

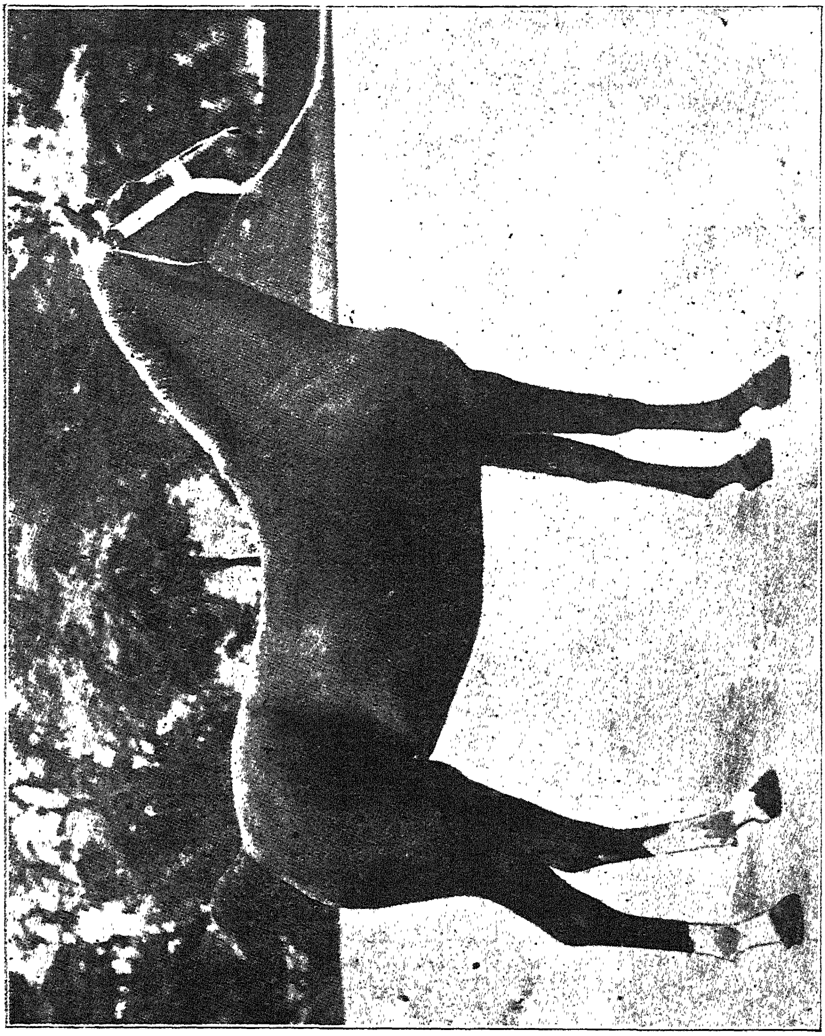
Hackney Filly, Ayton Sweet Nancy.

The two-year-old chestnut Hackney filly 12420 Ayton Sweet Nancy was bred and is owned by Mr. H. Liddell Grainger, Ayton Castle, Ayton, Berwickshire. She was foaled in 1898, and is got by His Majesty 2513, dam 1110 Flirt. Sweet Nancy has won the following prizes the only times she was exhibited this year:—First, Hackney Horse Society Show, London; first, Wharfedale Show (Otley), gold medal for best Hackney filly in show, and Hackney Horse Society's silver medal for best Hackney Horse Society's gold medal for best Hackney mare in show; first, Royal (York). She possesses a charming look-out, with plenty of bone and muscle about her, and she moves freely and levelly.—*Mark Lane Express.*

The Permanence of Popular Delusions.

A very remarkable, and I may say unexpected, illustration of the permanence of what are regarded by scientific and accurate observers as popular delusions, has recently been published by no less an authority than Dr. Oliver, professor of physiology in the Newcastle College of Medicine. In his introductory lecture on Inheritance, Atavism and Telegony he makes statements which it is exceedingly undesirable should gain general circulation without contradiction. In speaking of telegony, or the influence of the first sire on subsequent offspring of the same female, he says:

"There is no proof that the blood of the mother or her system can be saturated, and yet such circumstances as the following are known.



TWO-YEAR-OLD HACKNEY FILLY 12420 AYTON SWEET NANCY

In breeding Bedlington terriers, it is desirable to obtain dogs with as powerful jaws as possible. A Bedlington bitch is, therefore, first covered by a bull terrier dog, and the mongrel litter is destroyed. Covered subsequently by a Bedlington terrier dog, the litter is practically pure, with the exception that the puppies have stronger jaws than they otherwise would have had, and they also show much of the gameness of the bull terrier. Anatomical structure and physiological characters are, therefore, present in the second litter which do not belong to the breed at all, and they could only have come from the bull terrier."

On making inquiry of Mr. Rawdon Lee, author of a large series of books on *Modern Dogs*, and who is familiar with the dogs of the Bedlington district, he tells me that such a proceeding is utterly unknown to him, and, he believes, to everyone else in the somewhat wide range of country where the breed is encouraged; indeed he treats the statement with ridicule. Dr. Oliver then proceeds to state, what is perfectly true, that it is difficult to find examples of telegony in the human race, where instances, if it occurred, would be exceedingly common, owing to the marriage of widows, and then gives a mere legend about some negroes in Surinam which has no possible value, and certainly does not prove, as he suggests, the possibility of telegony. But the most extraordinary statement in his lecture is his quoting Professor Ewart's experiments on the breeding of zebra hybrids, and misstating the results at which he arrived. To quote Dr. Oliver's own words:—

"Professor Ewart, in his experimenta at Penicuik, obtained striping and marking of succeeding foals by different sires as in Lord Morton's mare."

If he will turn to Professor Ewart's experiments and read them he will find that that is the very thing he did not do. In the first place Professor Ewart, in his paper read before the Royal Society on June 1, 1899, showed that the evidence in support of the belief that Lord Morton's mare was infected by the quagga is far from satisfactory. The statements that I published in the *Field* in my account of his exhibits at the York Show are perfectly true, and have never been questioned. I stated that

"Of the ten mares which have been mated with the Burchell zebra, Matopo, in Professor Ewart's experiments there is not one that shows the slightest trace of any infection in the subsequent progeny, either in colour, mane, tail, hoofs, voice, or disposition. In his own experiments with horses, cattle, sheep, dogs, cats, rabbits, mice, guinea pigs, ducks, fowls, or pigeons he has never had one single example proving the truth of this generally believed and widely acted upon doctrine."

In a paper read before the National Veterinary Association, Dublin, as recently as August in the present year, Professor Ewart stated that the fourteen subsequent foals bred by eight mares that had previously bred to the zebra afforded not the slightest evidence

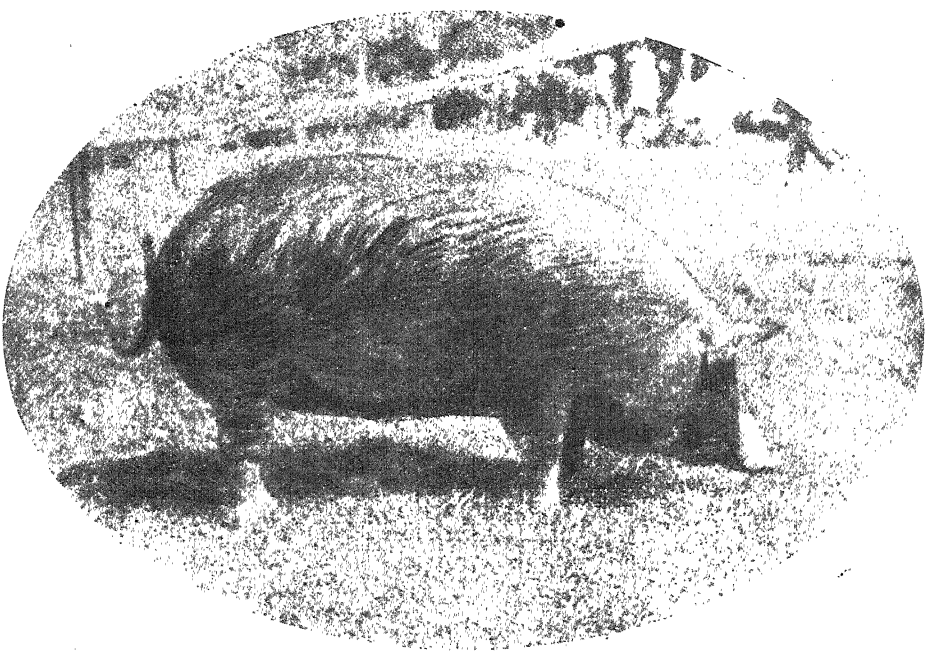
of the existence of telegony, or of their having been in any way infected by the zebra Matopo.

Another remarkable example of the persistence of popular delusions, which the *Field* has recently pointed out, is the American craze for the Belgian hare, which they believe to be a cross between the hare and the rabbit. The price that fanciers and faddists choose to pay for animals is not a matter of very great importance, but the belief in telegony would influence all stock breeders, and therefore it is deeply to be regretted that, if this belief is unfounded, it should be circulated with inaccurate statements by such an authority as a professor of physiology at a medical school.

W. B. TEGETMEIER in *The Field.*

Tamworth Sow Favourite III.

(From *Mark Lane Express.*)



MR. D. W. PHILLIPS' FIRST PRIZE TAMWORTH SOW.

The Tamworth Sow Favourite III. is the property of and bred by Mr. D. W. Phillips, The Ashes, Whitacre, Birmingham. This sow, whose sire was Whitacre Welsham 5411, and dam Whitacre Favourite 7830, won first prize at the Royal Counties Agricultural Society's

Show at Winchester in June, but at the Bath and West Show, at Bath, it was placed second.

Tamworths are one of the most valued of the English breeds of pigs and the source of the choicest breakfast bacon.

Prices of Farming Stock in New Zealand.

It would appear from the quotations in the *N.Z. Weekly Press* that there is an advance in all kinds of live farming stock, possibly induced by the demand in South Africa:—

"There has been a big boom in store cattle in Southland lately, several large sales having been held, and with most satisfactory results to the vendors. Following upon the dispersal sale at Merrivale and the special sale at the Wallacetown yards, there was a sale at Wyndham on the 31st ult., when 240 head were offered and sold as under: 34 steers at £5 8s. to £5 10s., 106 eighteen-months to two year steers and heifers £3 7s. 6d. to £3 12s., eighteen-months heifers £2 10s. to £2 17s. 6d., 13 cows £3 12s. The following were the results of the Five Rivers Estate sale:—600 hoggets 12s. 11d., 4,224 at 12s. 7d., 688 at 10s. 9d., 85 culls 10s. 9d., 270 two-tooth wethers 18s., 700 at 16s., 70 at 13s. 6d., 330 yearling cattle £1 15s. to £3, 75 spayed heifers £6, 56 spayed cows £4 2s., 23 three-year steers £5, 90 two-and-a-half year £4 16s., 85 eighteen-months £3 15s., 74 two-and-a-half year heifers £3 15s., 118 eighteen months £3 15s., 127 eighteen-month heifers and steers £3 9s."

The above prices are no doubt a good advance, but they are a long way below those ruling in this country, which are, we believe, the highest ever known; and with the present state of the country, one cannot tell when there will be any change.—EDITOR.

Zebra Hybrids and Telegony.

It is with very great pleasure (writes Mr. W. B. Tegetmeier in *The Field*) that I acknowledge having received permission to publish the following most interesting communication, being extracts from a letter to Professor Ewart by Baron de Parand, Porto Novo do Cunha, Brazil. It is valuable from a practical point of view as showing the ready docility of zebra-horse hybrids, and as suggesting the probability of their utility in South Africa and other countries where mules, from their extreme power of endurance and prolonged longevity, are in great demand, and also from its high scientific interest as bearing on the general, though unfounded, belief in the influence of a first sire, which is termed telegony.

Describing his zebra mules, or zebroids, Baron de Paraud writes as follows:—

"I have at present the following zebroids:

"1. MENELIK, born on Jan. 15, 1898, out of the mare Ella; he is a very deep brown bay with black stripes, and is 46in. in height, measured from the sole of the foot to the withers; he will be small, as his dam is a small mare, she being only 48in. high. Menelik already works in harness, alone, and also yoked with a small mule; he trots very well, draws the carriage with spirit, is not timid, and is afraid of nothing. When he completes three years I will mount him. I will not, however, train him for the saddle before then, because experience has shown me that animals trained for the saddle and ridden before the age of 3 years become what we call selles, *i.e.*, the spine bends, and afterwards the back does not show a straight line but forms a curve, and the animal is not so strong.

"2. SABA, of the female sex, born June 20, 1898, out of the mare Denise. She is a light bay with black stripes, and is at present 52in. in height. Her mother is a grey mare, almost white, 1m. 60. (equal to 63in.) in height. Saba, who will be very tall, is quiet, active, and spirited.

"3. SALOMON, born July 2, 1898, out of the mare Ingellza. His colour is a greyish light bay (isabella gris) with very dark grey stripes, some, especially on the neck and shoulders, almost black. He is now 54in. high; his mother being a brown bay mare, 1m. 60. (63in.) in height. Salomon will be a very tall, strong, and active animal, and meanwhile is very obedient and docile.

"4. ERYTHREA, of the female sex, born Jan. 18, 1899, out of the mare Ella, and is consequently a sister to Menelik. She is a light bay with very deep bay stripes, and is 44in. in height. She will be small, but very lively and agile, and will form a pair later on with her brother Menelik.

"5. PALMYRA, born Oct. 8, 1899, out of the mare Uba. She is a golden bay with very deep bay stripes, and is 50in. in height. Her dam is chestnut coloured, and is very tall. Palmyra will also be very tall, and very lively, agile, and quiet.

"I have yet another zebroid, only fifteen days old, which will grow very tall; she is half-blood Arab mare. I have therefore at present six zebroids. There is one thing to remark: all these zebroids have stripes similar to the zebra Canon, except that on the croup and part of the hind-quarters the stripes are substituted by small spots. Further, the zebra Canon has white legs, whereas all the zebroids have legs the same colour as the body, and they are striped to the hoof.

"As for telegony or infection, I do not believe in it, either scientifically or in practice. I have never observed a single case which one could attribute to previous infection. In my observations I have instances which prove that the first gestation has no influence on subsequent gestations. The mare Ella, mother of the zebroids Menelik and Erythrea, was served eight days after the birth of

Erythrea by a horse of quarter Arab blood. She has a foal having nothing which could recall the zebra. The mare Denise, mother of the zebroid Salomon, has had a foal which in no way resembles its brother zebroid. I have a mare which has had two foals by a horse, a native of this country, after she had had two by a Percheron horse, following on three by an Arab horse from Constantinople. All these foals showed the characters of their sires. Those by the Percheron horse do not resemble in anything the offspring of the native stallion, and those by the Arab resemble in nothing their elder brothers.

"I have many relatives and friends who have large establishments for the rearing of mules, where they obtain 400, 500, and sometimes 1,000 mules in the year. In all these establishments after two or three breeds of the ass with the mare, the breeders cause the mare to be crossed by horses, because they say that the mares after three gestations of mules must be changed, otherwise they become sterile. And certainly in all these establishments there has never been a horse resembling the ass or the mule. I have also a large breeding establishment for cattle, in which I have made crosses with bulls of different breeds; for example, I have crossed Dutch cows with Durham bulls, and afterwards crossed the same cows with Jersey bulls. Yet the offspring had nothing of the Durham breed. One could easily see that it was the offspring of a Dutch cow and a Jersey bull.

"Later, I have crossed the offspring of the Dutch cows and Durham bulls with a Jersey bull. In the offspring of this cross one could notice some resemblance to the three breeds; for example, I have cows which have the characteristic colour of the Dutch cow (white and black), whilst the development of the body and breadth of the haunches are quite like that of the Durham, the head and quality of milk that of the Jersey.

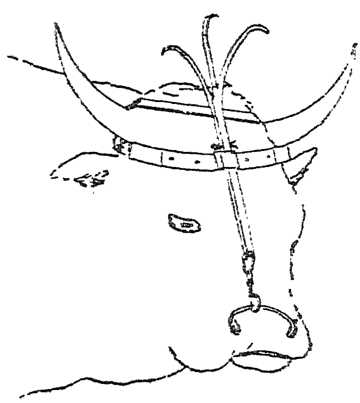
"I have seen, times without number, black females having alternately sons, mulatto and black, according as the father was black or white. All these children, brothers by their mother, bore no resemblance to each other; they were each the image of their respective father. At home I have a black servant who has four children; the first is black, the son of a black; the second is a mulatto, the son of a white; the third is also a mulatto, with the physiognomy of a Chinese—he is the son of a Chinaman; the fourth is the son of a redskin, and is the image of his father. In this woman, who has four sons, each by a different father, one could not attribute anything to infection.

"On the whole, I believe that the instances which led to the belief in infection were instances of atavism (or reversion to a distant ancestor). In connection with this I will relate to you a fact which will read like a fable, but its authenticity I can vouch for. Here, in Brazil, in all the towns and villages of the interior, there is to be seen among the images of the saints a black one, said to be that of a former black slave who had been a good servant to his masters, and had been canonised under the name of St. Benedict. Well, all the women who

are guilty of infidelity resulting in mulatto children at once excuse themselves by bringing in St. Benedict; saying either that they had attended a mass at an altar where was an image of the saint. or that they had blasphemed against him, calling him "black, or old slave," or from their desire to have a child, they had prayed to St. Benedict, and he, as was just, had granted their request and given a child of his own colour. Sometimes they vary the form, but it is always Saint Benedict who is to blame."

Baron de Parand alluded to the prevalent belief in the sterility of mares after producing three mules. I am not aware that such a belief has any foundation in fact or that it is acted upon in the mule breeding districts in France.

Breachy Cattle.



The above is a sketch of a plan for preventing cattle (especially bulls) breaking through fences. The rod is directly attached to the nose-ring, and supported by a strap.

Science in Raising Dairy Calves.

The following extracts are taken from a paper by Professor J. A. Conover, on raising calves with skim-milk, read at the last annual meeting of the Kansas Dairy Association :—"I will tell you how we raise our calves here at college. We allow them to run with the cow for the first four or five days, or until the milk becomes fit for use. It is absolutely necessary for the best health of the calf, that it should have the colostrum, or first milk. This is a substance very easily digested, is rich in albumen and salts, and is a perfect regulator of the liver and bowels and must not be withheld from the calf.

A good mnay farmers object to raising hand-fed calves because they claim it is such a bother to teach them to drink. The secret of the whole matter is in letting the calf get hungry before you attempt to give him milk. We do not try to give our calves anything until they have been away from the cow twenty-four hours and sometimes longer. It is then an easy matter to teach the little fellow to drink. If he is a little obstinate at first let him suck the finger a time or two, gradually taking the fingers away when you get him started. In most cases this will not be necessary. Under all circumstances deal gently with the calf. You must remember that he has not been in the world long enough to get used to all the "ups and downs."

The calf just taken from the cow should have about ten pounds, or five quarts of whole milk a day, fed in three feeds, four pounds night and morning and two at noon. This amount should gradually be increased to fifteen pounds when the calf is three weeks old. At the end of three weeks we begin to get the calf on to skim milk ; do this gradually by cutting off half a pound of whole milk and adding a half pound of skim milk each feed. Keep a supply of nice, fresh hay, preferably clover or lucerne, where the calf can get it, for he will begin to eat hay when about three weeks old, and sometimes earlier.

As soon as possible teach the calf to eat a little grain; this can be done very easily by putting a handful in his mouth after he has eaten his milk; or if you do not care to take this extra trouble keep some in a little box where he can get at it; he will soon learn to eat it. We have found that Kaffir corn meal is one of the best grains to be supplied to young calves. There seems to be a certain element in it, tannin probably, which tends to keep them from scouring. We had very little trouble with scours among our thirteen calves and we fed Kaffir corn exclusively. The calves like it and will eat it in preference to other grains.

Should there be any trouble with scours cut down the milk immediately and give from one to two ounces of castor oil, and if very bad, from ten to fifteen drops of laudanum, for a day or two; in most cases the castor oil will be all that is necessary.

The best treatment for scours lies in prevention; keep the stalls and yards where the calves run perfectly clean, and it is well to scatter some air-slacked lime around quite often. Wash and scald out all pails used to feed in and set them out in the sun. Guard against over-feeding the calf; it does not want a pailful of milk just because the milk is skimmed. Many people make a great mistake in feeding, just on this one point. Feed all milk warm and sweet, if possible, but if you must feed sour milk accustom the calf to it gradually and then feed it sour all the time, and if possible at the same degree of acidity. You must remember that the calf's stomach is a very delicate piece of machinery and easily gotten out of order. Nature's way is to feed the milk warm and sweet, and the best results will be obtained where nature's way is followed as closely as possible. I prefer to feed the milk warm from the very first until I have the calf off the skim milk at the age of five or six months.

The amount of skim milk varies with the individual calf. It should be increased as the calf grows older. Whenever an increase is made do it gradually.

At the age of five months the calf should get from twenty pounds to twenty-four pounds according to the individual. One authority says that in some cases thirty pounds may be fed.

The heifer calf intended for the dairy should be made to gain about a pound and a half a day. Give bulky feeds, such as bran, oats, and a little Kaffir or mealie meal, with all the nice, bright hay it will eat. The Beef calf should be made to gain every pound possible, and should never be allowed to lose any. It is possible to make a well bred calf weigh a thousand pounds when it is a year old. Give it all the grain it will eat, and if it is not on pasture, plenty of good hay.

To keep calves from sucking each others' ears, tie them up far enough apart so they cannot get to each other. If the grain is put in the trough immediately after feeding they may be turned loose; if not, keep them tied till their mouths get dry. Stanchions are very nice by which to fasten the calves while they are being fed, but they must be far enough apart that the calves cannot reach each other across the space. Keep a supply of nice, fresh water where the calves can get at it all the time. You will be surprised to find how many sips the calf will take during the day. Our 13 calves drank in seven days 869 pounds of water, or on an average of 8 8 pounds per head per day. The oldest calf at this time was about three months old, and the youngest, one month. We found that a pig waterer fastened to a barrel was the nicest way to keep the water clean and have it always ready when the calf wanted it."

VETERINARY.

South African Horse-sickness; Its Pathology and Methods of Protective Inoculation.

By Alexander Edington, M.B., C.M., F.R.S.E., Director of the Colonial Bacteriological Institute, Cape Colony. Communicated by Sir David Gill, F.R.S. Received August 20, 1900.

[*From the* Proceedings of the Royal Society, Edinburgh, Vol. 67.]

This disease, so far as is known, is peculiar to South Africa.

While affecting the Transvaal and Rhodesia every year—beginning about the end of October and continuing until the following May, or even later—it only affects the Cape Colony and Natal in an epizootic form in certain years, although sporadic cases occur annually in certain localities.

Animals Affected.—It affects horses, asses, mules, and it has been asserted—although I have never seen such cases—that quaggas have also been killed by it.

A disease which occurs to a limited extent among cattle, called by the natives Imapunga, and one which exists as a widespread plague among high-bred sheep and goats in the Eastern Province of Cape Colony, are each closely related in their pathology with this malady.

Areas Infested.—The most dangerous areas are those which are relatively low-lying—independent of the absolute altitude of the district.

Period of Infection.—It has been commonly observed that where animals during a season of sickness are not permitted to graze after sunset and before the sun has dried up the dew from the herbage, they do not so commonly become affected as where such a routine is not carried out.

Horses which are stabled during the night are, as a rule, safe, but during last year 60 per cent. of the stabled horses in Eshowe, Zululand, died of this sickness. Veterinary Lieutenant Coley, A.V.D., who kindly made the observations for me, stated that these horses were mainly fed on Guinea or Ubaaba grass mixed with forage or Indian corn. This grass was usually cut in the evenings and made into bundles till next day. Those who took particular care to have the grass thoroughly dried in the sun before using it, did not lose their horses, while those neglecting this precaution lost heavily.

The disease is only directly contagious; for while inoculated horses have died in my stables among clean animals, I have never found, during observations extending over seven years, a single case of infection from such a source.

The annual mortality in Rhodesia and the low-lying parts of the Transvaal amounts to over 90 per cent.

Animals which have recovered from the sickness are termed "salted," and are from six to ten times increased in market value.

Secondary Fever.

Animals which are "salted" are liable to subsequent attacks of fever which have no necessary relation to fresh infection. I have observed numerous cases of this description among the "salted" animals under my observation and during periods when the sickness was unknown.

Symptoms of Disease.

It occurs under two forms—the Dikkopziekte* and the Dunpaardeziekte.† In the former the head and neck swells up enormously, thus affording trustworthy indications of illness during life. In the latter form, as a rule, no symptoms appear until close to the period of

* Dikkopziekte, a Dutch word signifying "thick-head sickness," is applied to the form in which the swollen head is the most obvious symptom.

† Dunpaardeziekte, "thin horse-sickness," is applied to the form in which the head is little or not at all swollen.

death,when the animal becomes subject to very rapid breathing with heaving at the flanks. At the moment of death, in both forms, it is common to find a huge cloud of white foam ejected from the mouth and nose. This foam is produced from a free exudation of blood plasma into the air passages.

Owing to the fact that the animals suffering from the Dunpaardeziekte show no symptoms until toward the end of the period of illness, it had come to be believed that the whole period of the disease was limited to a few hours' duration.

Post-mortem Phenomena.

The pericardium is almost invariably filled with a yellow fluid which, while usually clear, is sometimes blood-stained. Solidified gelatinous exudate is frequently found in relation to the beginning of the aorta. The pleural cavity is frequently occupied by yellow fluid, and the interlobular and sub-pleural tissues are also frequently distended by this material. The interlobular tissue is frequently so distended by exudation that the lung tissue proper is dissected up in all directions. The subcutaneous tissue, especially about the great vessels in the neck, is commonly found to be invaded by this exudation, while in the Dikkopziekte the swelling of the head and neck is due to this effusion.

The yellow fluid of the pericardium and the pleuræ is spontaneously coagulable in the presence of minute traces of blood.

These represent the more characteristic pathological conditions obtaining in this disease, among which one characteristic is most noticeable by its absence, *e.g.*, inflammatory phenomena. Pathological phenomena are, therefore, for the most part to be ascribed to the marvellous exudation of blood plasma, which, while seen more or less throughout the serous and subcutaneous tissues, is best marked within the thoracic cavity.

In my annual reports as Director of the Colonial Bacteriological Institute, I have referred to the morbid anatomy in greater detail.

Inoculation Experiments.

For the purpose of conveying to healthy animals the infection from those already sick three materials have been made use of, viz :—

1. The yellow fluid from the trachea of infected animals.
2. The yellow fluid from the pericardium of infected animals.
3. The blood of infected animals.

The use of the first two fluids has not always been successful in setting up the disease, but fresh virulent blood has invariably proved successful.

Methods of Use of the Materials mentioned.

(*a.*) By subcutaneous injection.

(*b.*) By insertion of a seton, impregnated with the fluid, under the skin.

(*c.*) By drenching, *e.g.*, giving a dose by the mouth.

Sites Selected.

(*a.*) Directly into the lung tissue by hypodermic needle operating through the skin over an intercostal space.

(*b.*) Into the subcutaneous tissue of the neck.

(*c.*) Into the subcutaneous tissue of the flank.

(*d.*) Intravenously.

Any one of the channels selected is equally suitable, but the incubation period is somewhat shorter when the intravenous method is used.

Period of Incubation.

When the malady is induced by the inoculation 2 or 3 c.c. of the blood of an animal which has died from spontaneous disease, a mean period of eight to nine days supervenes, after which the temperature begins to rise. The elevation is gradual, with remissions during the night, but attains to 106° F., as a rule, before death, which usually occurs after four or five days of fever.

Preservation of the Virus.

After having transmitted the disease through a succession of animals, I found it possible to preserve its virulence unimpaired through a long period of time.

I bleed the animals into bottles which hold 800 c.c. of fluid. These bottles are prepared by placing in them 50 c.c. of a 10 per cent. solution of neutral citrate of potash and plugging the necks with cotton wool. Such bottles are sterilised in the autoclave previous to use. After being filled with blood, the influence of the citrate arrests coagulation, and the corpuscular matter soon subsides, leaving the more or less clear plasma above. The latter is drawn off to half the original bulk, and is replaced by a 50 per cent. solution of glycerine and water, containing 0·25 per cent. of pure carbolic acid. Such a mixture preserves its virulence quite unimpaired for over two years. One c.c. of this material serves to induce the disease in its characteristic form, but if the dose is increased to 3 or 5 c.c. the period of incubation is shortened, and the post-mortem phenomena are less characteristic

From the observations I have made I have found that the subcutaneous injection of fresh or properly preserved horse-sickness blood produces symptoms during life, and shows pathological changes after death which are not to be distinguished from those found in the spontaneously occurring cases of the lung form of the disease. It is somewhat remarkable that the only cases in which I have succeeded in producing the Dikkop form were those in which the virus which was used was somewhat septic. When, however, I have inoculated virulent preserved blood into partially protected animals, I have in a number of cases, although not in all, produced this form. In three cases where the virus used has been sufficiently attenuated as not to produce death but a longer febrile period than is found in the fatal cases, I have also seen the Dikkop form produced.

Effect of Desiccation on the Virus.

Citrated blood dried in a thick layer was rendered non-virulent. Where, however, such blood was rapidly dried on glass plates in very thin layers it was found, when two grammes were dissolved in salt solution and injected into horses, that it produced fever, but not in a virulent form. The fever thus induced gave practically no protection against a dose of virulent blood at a subsequent date. Mild attacks of horse-sickness do not, however, give such protection as is required to resist virulent blood.

Experiments made in regard to Protective Inoculation.

The yellow fluid from the pericardium of an animal which had died from the disease was filtered through a Pasteur filter. 100 c.c. of the filtrate was injected subcutaneously into a horse. Eleven days later it was inoculated with 3 c.c. of preserved blood injected subcutaneously. The result, which culminated in death from ordinary horse-sickness, showed that no protective influence had been exerted by the filtered fluid.

Effect of Calomel.—This drug, in doses of 30 to 60 grains daily, had the effect of retarding death, and the blood of such animals drawn at periods later than that at which death usually occurs was distinctly weakened in virulence. Such blood has on several occasions, though not in all, induced attacks of the disease, from which the animals not only recovered, but acquired protection against virulent blood injected subsequently.

Transference of the Disease to other Animals.

(*a.*) *Donkeys.*—The subcutaneous or intravenous inoculation of donkeys with fresh virulent blood is followed by fever. The period of onset is irregular and uncertain, while the duration of the febrile period varies from one or two days to, in my experience, a week or more.

The amount of the virus used has some relation to the severity of the fever, but the special susceptibility of the animal is the principal factor in determining the degree and duration of the fever.

Two donkeys, equal in age, were inoculated respectively with 1 c.c. and 50 c.c. of the same blood. In both cases a moderately severe reaction followed, and while the animal receiving the injection of 50 c.c. was rather more severely affected than the other, the difference on the whole was but slight.

In all I have inoculated twelve donkeys, and, while none died, the difference in susceptibility was most clearly demonstrated, some scarcely showing any reaction at all.

(*b.*) *Cattle.*—The susceptibility of cattle to the inoculated disease is excessively variable. I have inoculated twenty-one cattle. A definite febrile reaction was produced in seven cases, and four died.

In the case of one which died, and in which the symptoms produced were quite characteristic of those found in horses, the inoculation of its blood into a clean horse was followed by the usual period of

incubation, the onset of fever, and death from characteristic horse-sickness.

The disease known as Imapunga, which occurs to a limited extent among cattle, presents features which in every respect are identical with those produced in susceptible cattle by the inoculation of virulent horse-sickness blood.

(*c.*) *Goats.*—Angora goats are also to a limited extent susceptible to horse-sickness infection. Of seventeen which was inoculated, a febrile reaction occurred in ten; none died. From one of the ten blood was taken, which was used to inoculate an ox. The latter animal developed fever, and died with exactly similar symptoms during life, and showed the same post-mortem conditions as the ox already referred to, whose blood, when inoculated into a horse, produced characteristic horse-sickness.

(*d.*) *Sheep.*—Sheep are also susceptible. Of ten which were inoculated, six showed a well-marked febrile reaction, but none died.

I have not succeeded in transferring the disease to rabbits, guinea-pige, rats, or mice.

The Transmission of the Disease for Protective Inoculation by Means of the Inoculation of Fresh Blood.

The inoculation of horses with the blood of donkeys which were suffering from fever produced by inoculation has been attended with most varying results.

In some cases death has been produced, in some an irregular febrile period, while in others no apparent result has followed. The period of onset of the fever has likewise been most variable. In some cases a reaction has been set up corresponding to the normal period of incubation which obtains in horse-sickness, while in other cases reaction has been delayed for more than 25 days.

Influence of the Reaction produced.

Where fever has set in on or about the eighth day, been moderately severe in degree and duration, and subsequently subsided, a very definite degree of protection has been produced, although seldom high enough to set up such a resistance as to oppose death when the animal was subsequently inoculated with virulent blood.

A striking demonstration of variable susceptibility among horses was furnished during these experiments, Of three horses and one mule which were each inoculated subcutaneously with 5 c.c. of fresh blood—

The mule had no reaction.
Two horses had scarcely any reaction.
One horse had a good reaction.

In the case of the last horse, when subsequently inoculated with virulent blood it suffered severely and just managed to recover. The others had not been protected to any appreciable degree. Obviously, therefore, the susceptibility of the last animal had been such as to

admit of infection from the donkey's blood producing reaction and the establishment of protection, whereas the higher degree of insusceptibility of the other animals resisted infection, and in this way evaded the onset of protection. This phenomenon forms the greatest barrier to protective inoculation, and has contributed to the enormous trouble I have experienced in devising a practical method of protective inoculation.

The fresh infected blood of cattle, sheep and goats is still more variable in its results than that obtained from the donkey.

Numerous other experiments of the same nature have been made, all of which result in showing—

(a.) That donkeys, oxen, goats and sheep possess a very irregular susceptibility to the disease.

(b.) That the blood of donkeys which do not react may produce no effect when inoculated into the horse.

(c.) That the blood of donkeys which have evinced moderate reaction may produce intense reaction in some horses and practically none in others.

(d.) That a mild reaction in the donkey furnishes no definite assurance as regards the reaction which its blood may set up in horses.

Owing to the variable quality of the infection possessed by infected donkey's blood in the fresh state, I experimented with blood taken from donkeys and oxen which, after having been received, was preserved in the manner already described.

A large number of experiments carried out by this means furnished the following results:—

1. Protection was only obtainod where a definite amount of fever had been produced on several occasions, but unless the reaction was severe, the animal did not resist the inoculation of 1 c.c. of preserved virulent blood at a later period.
2. The susceptibility of horses to such a weakened or attenuated virus varies enormously. Of two animals inoculated with the same dose of the same virus injected directly into the jugular vein, one had a good reaction, the other very feeble. Neither were found to be protected when subsequently inoculated with virulent blood.

One inoculated with the same amount of the same preserved material two months later died from the primary inoculation, thus showing that even the attenuated virus can be satisfactorily preserved for a considerable period of time.

In the case of another animal which was inoculated intravenously with this virus no result followed. Fifteen days later the same inoculation was repeated. The temperature began to be elevated on the fourteenth day, and it died of horse-sickness seven days later. The primary inoculation in this case, while being ineffectual to induce the disease, had evidently lowered the susceptibility, so that a fresh stimulus, by the same virus, was sufficient to overcome the resistance entirely.

Having recognised that the blood of animals which lived beyond the ordinary period at which horses usually die from horse-sickness was lowered in virulence, I determined to attempt to produce this change *in vitro.*

Having, therefore, prepared bottles containing citrate solution, and having thoroughly sterilised them, selected animals were bled under the most rigid aseptic management, and the blood received in the bottles, which, after being replugged, were incubated at a temperature of 102 F. during ten days. In one such experiment, out of a total of fourteen bottles, thirteen remained perfectly free from extraneous organisms. Such blood after incubation was then preserved and tested.

I found, in this manner, that it was possible to produce an attenuated virus equally suitable for inoculation as that obtained from the donkey or the ox.

While, however, these experiments demonstrated that it was possible to protect horses by repeated inoculations of an attenuated virus, they equally demonstrated the irregularity of action, owing to the varying susceptibility to the disease in its attenuated form which obtains among horses.

Several important facts, however, which were elucidated, are deserving of careful consideration, viz.:—

Death in cases of horse-sickness cannot directly be ascribed to hyperpyrexia, inasmuch as several horses have recovered after having experienced temperatures of over 107 F.; while others, which have died, and in which characteristic lesions have been found, have not had a temperature exceeding 105 F.

Protection can be arrived at without the production of very great reaction, provided that a number of inoculations are made into the animal, and that these have been so arranged as to proceed very gradually to the highest degree of virulence.

3. It is exceedingly difficult to determine the exact degree of attenuation in any particular sample of an attenuated virus. I have usually attempted this by the inoculation of the virus into one or, at most, two horses; but if the susceptibility of such animals happens to be of a low grade, then the reaction produced may not obtain in other horses for which it may subsequently be used. In other words, to determine exactly the strength of an attenuated virus, it would be necessary always to make the test on at least five animals.
4. The indication for future experimentation was thus to call for the discovery of some method by which a virus of standard virulence might be, at will, reduced to any required degree of attenuation.

Experiments were also made to determine whether the blood of an animal suffering from "secondary" fever had any infective property. To this end animals under "secondary" fever, with temperature as high as 105 F., were bled and the blood used to inoculate clean

animals, but in no case was any reaction produced thereby. I therefore am convinced that the blood during "secondary" fever is non-infective.

Experiments with Serum and Defibrinated Blood on Animals which recovered from Horse-sickness.

The experiments made have included serum derived from—

1. Animals formerly "salted."
2. Animals formerly "salted" and subsequently reinoculated by periodic injections of gradually increasing doses of virulent blood, the maximum dose being 1,000 c.c.
3. Animals treated as in Clause 2, but subsequently permitted to rest for several months and then reinoculated with a small dose (5 c.c.) of virulent blood.

Under the first clause, serum was obtained from a well-"salted" animal which had been twelve days, previous to bleeding, inoculated with 5 c.c. of preserved virulent blood.

Animals which were inoculated with 2 c.c. of virulent blood were subsequently inoculated with large doses of serum (100 c.c. or more). The inoculations, in some cases, began on the day that virulent blood was injected; in others it was delayed until the temperature began to rise, but although the total amounts given exceeded 1,000 c.c., no definite interference with the course of the disease was noticeable. Under Clause 2, "salted" animals were inoculated with progressively increasing doses of virulent blood. When these animals had been inoculated with doses of virulent blood equal too 1,000 c.c. they were allowed to rest for eight to twelve days, after which they were bled.

Of this serum, 500 c.c. was inoculated at one dose into a horse, which, during thirty-three subsequent days, manifested no signs of illness due to the inoculation. When this period was completed, it was inoculated with virulent virus and as a result died of characteristic horse-sickness. No evidence was shown that the serum had in any way interfered with the action of the virus. Where, however, this serum was used to inoculate animals which were already infected, a very curious change in the character of the disease occurred.

The animals became affected, usually in thirty-six hours, with hæmoglobinuria, which later passed into hæmaturia and ended invariably fatally, if the disease was virulent. In two cases, however, where the disease had been induced by an attenuated virus, the hæmaturia came to an end with the subsidence of the fever. In all, this curious condition was produced by serum in nineteen cases.

Where animals are bled into citrate solution, the plasma is of a yellow colour, but in cases which eventually became the subjects of hæmaturia, I noticed, if they were bled about twenty-four hours previous to the onset of this condition, that the plasma was red coloured. It is therefore evident that the condition has its origin in the blood.

In several cases animals, which were partially protected, became

subject in a slighter degree to this complication, if they were reinoculated with virulent blood and were unable to resist it.

This Blackwater may have some relation to the Blackwater Fever in man. It is generally believed in Rhodesia that Blackwater does not occur as a primary disorder, but only supervenes in persons who have previously been the victims of malarial fever.

It seemed to me that this serum might in some way be associated with a residual infection. To determine this I inoculated a "salted" horse, which had also had repeated large injections of virulent blood, with 50 c.c. of fresh blood. I bled it eight days later, and with 5 c.c. of its blood inoculated a clean animal, which thereafter had a very slight rise of temperature on the eighth day.

An animal similarly treated was finally inoculated with 300 c.c. injected intravenously and 20 c.c. subcutaneously thirty-nine days previous to being bled. When bled, the blood was defibrinated, and 100 c.c. was injected into each one of six animals. No evidence was shown of any infectivity of the blood.

I now determined to make use of the serum from animals which, under Clause 3, had been allowed to rest for periods over one month previous to the collection of their serum.

This serum is that which is now being used for the purpose of protective inoculation.

I have determined with regard to it—

1. It possesses no curative action which in practice would be of any avail to restrain the course of the disease.

2. Since an injection of 100 c.c. into one animal has absolutely no effect in restraining the action of 1 c.c. of ordinary preserved virus inoculated subcutaneously on the other side, it does not possess any immunising power which would be of practical value in withstanding infection.

3. Its germicidal activity is extremely weak, as is shown by the following experiments :—

(a.) 1 c.c. of fresh virulent blood was mixed with 100 c.c. of serum, and after being kept for twenty-four hours in the ice chest was inoculated into a clean horse. The animals had a sharp febrile reaction.

(b.) Another animal was treated in the same way, but the serum and blood was injected immediately after being mixed. This animal also had a reaction, but less severe than the former. Variation of susceptibility must of course be taken into account, and, in order to establish this conclusion satisfactorily, a considerable number of animals would require to have been simultaneously dealt with.

(c.) Equal volumes of serum and preserved blood were mixed and kept at ordinary room temperature for four days. Of this mixture, 2·5 c.c. was injected subcutaneously into a clean animal. Fever set in after the usual period of incubation, pursued its characteristic course, and the animal died under

circumstances and in the usual time which obtains after the use of pure virulent blood.

Since 1 c.c. of virulent blood mixed with 100 c.c. of serum produced a sharp febrile reaction in one animal but had practically no effect in some others, and since 1 c.c. of blood and 200 c.c. of serum produced a reaction in another animal, it was clear that under this method also I should have to meet differences of animal susceptibility.

It was so far fortunate that preserved virulent blood acted equally well as fresh blood, so that a standard virus is easily prepared and maintained, and by mixing the serum of a considerable number of animals I am able to standardise a large volume of serum.

I concluded, therefore, to determine the amount of serum which, when mixed with a definite amount of blood, would serve, acting in concert with the natural protective bodies in the system of the average horse, to ensure the production of the modified disease. After fourteen days should have elapsed subsequent to this inoculation, provided a severe reaction was not set up, I intended to re-inoculate with the same dose of virulent blood, but a much reduced quantity of serum. Again, after fourteen days, the procedure should be repeated, the dose of virulent blood remaining a constant quantity, but the dose of serum being still further reduced. Finally I intended to inoculate with virulent blood by itselt.

In the first three series of experiments sixteen horses were used. These were inoculated as follows:—

1st Inoculation	1 c.c. virus and	100 c.c. serum	(10 animals).	
	1 c.c. ,,	90 c.c. ,,	(4 animals).	
	0·5 c.c. ,,	50 c.c. ,,	(2 animals).	
2nd Inoculation	0·5 c.c. virus in	30 c.c. ,,		A slight variation of the quantities was made in several cases.
3rd Inoculation	0·5 c.c. ,,	15 c.c. ,,		
4th Inoculation	0·5 c.c. pure preserved virulent blood.			

The following shows the results obtained, and where the remark "salted" is made, it is to be understood that the animal has, at later dates, withstood enormous doses of the most virulent blood.

Animal.	Reaction.	Result.
1st.	No reaction at all	Salted.
2nd.	Reaction to 1st only	,,
3rd.	No reaction	,,
4th.	Slight reaction after all four ...	,,
5th.	Reaction to 4th	Died.
6th.	Slight reaction to 1st	,,
7th.	No reaction	Salted.
8th.	Reaction to 4th	Died.
9th.	Slight reaction to 3rd; after 5th ...	,,

Animal.	Reaction.	Result.
10th.	Slight reaction to 4th	Salted.
11th.	Slight reaction to 4th ...	,,
12th.	Reaction to 5th	Died.
13th.	No reaction	Salted.
14th.	Reaction to 5th	,,
15th.	Reaction to 4th	,,
16th.	Reaction to 4th	,,

In the next experiment seven animals were used, which were inoculated as follows:—

Inoculations.

1st	1 c.c. virus and 100 c.c. serum.				
2nd	0·5 c.c.	,,	25 c.c.	,,	
3rd	0·5 c.c.	,,	10 c.c.	,,	
4th	0·5 c.c.	,,	1·5 c.c.	,,	2 had 0·5 c.c. pure virus.

The results were as follows:—

Animals.	Reaction.			Result.
1st.	Slight reaction to		5th ...	Salted.
2nd.	,,	,,	3rd and 5th	,,
3rd.	No	,,	4th ...	After a large dose of pure virus, died.
4th.	Slight reaction to		2nd	Salted.
5th.	No	,,	4th	After a large dose of pure virus, died.
6th.	Slight	,,	2nd	Salted.
7th.	,,	,,	3rd	,,

Note.—Where "5th" is mentioned, it refers to a dose of pure virulent blood.

Total animals inoculated		....	23
,,	,,	died	9
,,	,,	salted	14

The tests thus applied have been of the most severe character, and despite the fact that these are only of the value of preliminary experiments, the results are extremely satisfactory.

Obviously animals have been sacrificed which, under altered methods, might have been saved, for the outcome of these inoculations goes to show that, unless some reaction has been produced during the earlier reactions, there is no certainty that an animal is protected. Nevertheless it is equally proved that some have become highly protected without having shown any reaction at all.

The indication, therefore, has been to increase the dose of the virus used in the primary inoculations, even at some risk to the more susceptible animals.

In a subsequent series of animals this has been carried out in the following manner:—

1st.	Inoculation	2 c.c. virus and		50 c.c. serum.	
2nd.	,,	2 c.c.	,,	20 c.c.	,,

Twelve animals have been simultaneously inoculated in this manner.

The reactions produced have been as follows :—

Animal.	1st Inoculation.	2nd Inoculation.
1	None.	None.
2	Slight.	Slight.
3	"	"
4	"	Severe.
5	"	None.
6	"	"
7	Severe.	Slight.
8	Slight.	"
9	None.	"
10	Slight.	"
11	"	None.
12	"	Severe.

Since one animal, after the first inoculation, had a severe reaction, it is evident that the limit of strength, consistent with safety, had been reached. The reactions, in the two cases, after the second, were extremely severe, and indicate that the limit of strength of virus for that inoculation had been slightly exceeded, if a widespread scheme of operation had been intended to be carried out among animals in the open.

These results would seem to indicate that fortified serum, *e.g.* that obtained from animals which, after "salting," have been reinoculated with large doses of virus, exerts a peculiar and definite action on the virus.

While, however, 100 c.c. of serum suffices to prevent 1 c.c. of virulent blood, when mixed with it, producing any great elevation of temperature, I have referred to a case in which a severe reaction was produced. Since, in another case, 200 c.c. of the same serum, with an equal amount of virulent blood, was followed by a reaction and a definite amount of protection, it is evident that the difference in susceptibility between the latter animal and those which react slightly after 100 c.c. of serum and 1 c.c. of virulent blood is equal to 100 c.c. of fortified serum. Moreover, as already shown, when the virus is attenuated by its passage through less susceptible animals, such as the donkey or cow, its effect, when used in the same dose, either by subcutaneous or intravenous injection, varies very greatly in different animals: in some producing no evident reaction, in others setting up some fever; while, again in others, its use was followed by the onset of the virulent disease resulting in death.

If, therefore, the admixture of serum with virulent blood is followed, on inoculation, merely by a modified form of the disease, it must be concluded that the serum, of itself, cannot be credited with this result, but that a peculiar quality, existing in the animal body, and varying in amount from animal to animal, must play an important part. Whether this principle is a simple body, or is a combina-

tion of several, cannot at this moment be determined, but for convenience' sake I would suggest that the name "Antagones" should be applied to it. The term need not be taken to imply either an antitoxic or germicidal body, but merely to denote the "defensive" properties which are already existent to a greater or less degree in all animals, or are produced or increased under special stimulation.

Since thoroughly "salted" animals and donkeys can be reinoculated and infection proved to exist in their blood for at least ten days subsequently, I am inclined to look upon the protection existing in "salted" animals as of the nature of a "tolerance," and to believe that true immunity, in horses, against this disease is never acquired.

HORTICULTURE.

The Vegetable Garden.

The following practical directions on kitchen gardening occur in Bulletin No. 94 of the U. S. Department of Agriculture :—

"The farm garden probably pays better than any other land on the place. No figures have ever been collected to show of what value its products are, but in the census of 1890 full statistics for market gardens were obtained and from these the conclusion just stated may be argued. The average value of garden stuff to the acre was found to be $147.17, while for wheat the average was only $11.65. Later reports show that the average for wheat, corn, oats and hay is $7.75 per acre. It seems clear, therefore, that market gardening is more profitable than farming. But the home garden must pay even better than the market garden, for it is not subject to the heavy losses incident to marketing perishable crops. Its products are used directly on the home table and there need be very little waste. A good garden will supply half the family's living, and when field crops show a balance on the wrong side it becomes a very important means of support.

In addition to this the garden may be a bountiful source of quiet pleasure. A keener appreciation of such natural joys of the farm home and skill to develop them would do much to repress the craving for excitement which draws young men from country life.

The garden is frequently under the care of the farmer's wife. It should be in such case as near as practicable to the kitchen, so as to be in easy reach for gathering the vegetables and for fifteen-minute opportunities for gardening. Also all heavy crops, as potatoes,

melons, squash and cabbage, must then be put in the field, where they can be cultivated with horse and plough.

Further, the site should be chosen with reference to sun and wind. A surface that slopes gently is to be preferred, and if the incline looks a little to the east it is better for it. A woodland or high hill as protection from winds and heavy storms is a great advantage, and equal or better will be a wall or hedge judiciously placed as a windbreak. A wire netting or high paling fence will be needed to keep out chickens if any be on the place.

Finally, soil and natural drainage must be considered in selecting the location. A light sandy loam is usually preferred, but fine vegetables are grown with ordinary care on heavy dark soils, on sticky red clays, and on sands apparently no better than the seashore. A mellow rich soil which will hold moisture well is easily recognized, and should be chosen if available; but hardly any soil need be rejected as impracticable until tried. Good natural drainage should be sought. Marshy or even damp ground will call for much labour and expense to make it fit for use. The character of natural drainage can best be determined by observation of the lay of the ground, of the appearance of the soil, and of the vegetation it has borne.

The size of the garden plot should depend on the size of the family and their taste for vegetables; also upon what vegetables are to be grown as field crops. A quarter of an acre is considered sufficient for a garden for a family of four. If potatoes, cabbage, corn and melons are to be grown in it this estimate is hardly sufficient; but if these vegetables are put in the field, as they should be, usually less than half an acre will be enough, giving room for early potatoes and sweet corn. The best shape is rectangular.

When the size and place for the garden have been determined, attention should be given to the drainage unless it is naturally very good indeed. The purpose is to get rid of an excess of water, which, left alone, cuts off the supply of air from the roots of the vegetables and stops their growth. The work must be done thoroughly before planting; afterwards no remedy can be found for a failure.

Surface drainage is frequently secured by the use of beds raised above the level of the ground. While this plan has disadvantages, it is commended where no other seems practicable.

But really effective drainage must be underground, and tile drains are usually most economical. Where tile cannot be had, stones or brush may be placed in the bottom of the ditch. For most soils the ditches should be 3 to 4 feet deep and about 30 feet apart. They should have plenty of fall and be carefully levelled at the bottom. When the ditch is ready for filling, sods, straw or paper should be put over the tile or stones to keep out the loose earth. A ditch can be dug in most soils with a spade alone if the digging is done so as to leave one edge of the spade free. This method of digging of course gives an advantage also in spading a hard soil for beds or other use.

Trenching will often take the place of drains. This consists of breaking up the soil two spades deep instead of one. From the top a spadeful of earth is thrown out and then the subsoil to an equal depth is cut, but it is not taken out and turned over. It is only lifted out a little and allowed to drop back in its place. This must be done, however, in a way to break up the earth thoroughly. Trenching needs to be done only every two or three years. It is especially useful when the subsoil is very hard or comes near the surface. Thorough subsoil ploughing renders trenching unnecessary.

The ground is made ready for planting by ploughing, harrowing, rolling and fertilizing. Spading may be done for a small garden or where special preparation is required for a limited space. The rake is usually employed in finishing off the beds. The soil should be broken fine as deep as the plant root may be expected to go. This is from 15 to 20 inches. The earth is left fine, loose and mellow far down, so the tender roots may grow through it freely. It then holds moisture and lies close to the roots, so as to supply them readily with food.

Autumn is the time for ploughing in any hard or cloddy ground, especially in stiff clays. The clods are left exposed to the frost, which is nature's most effective agent in opening up soil and putting it in order for plant growth. A stiff clay thrown on edge by the plough during the winter turns into a mass of fine-grained material, almost as open as sand and well adapted to growing vegetables. But if the breaking is left till spring, or if the ground broken in the fall has become compacted during the winter, the plough should be set deep, and harrowing and rolling continued until a fine loose condition is secured. As a rule two ploughings will be better than one and three better than two. Prepare the soil thoroughly before planting. Neglect of this will be felt all through the season. After the plants are growing it is too late to work the ground beneath them.

The time to plough in the spring is as soon as the ground is in condition to be worked. The proper condition for working can be be determined by squeezing a little of the soil in the hand. If it makes a ball and sticks to the hand, it is too wet; if it breaks hard, it is too dry. To work well, either for ploughing or hoeing, it should crumble easily and finely, and leave very little dirt on the hands.

Of leading importance in preparing of the ground is the supply of plant food, of which the chief essentials are nitrogen, phosphoric acid and potash. It is important that any fertilizer used to supply these elements should be thoroughly distributed through all the soil to be reached by the roots of the plants, and this distribution must be completed before planting. Turning and returning the ground and harrowing again and again are useful for the purpose.

A wise selection of fertilizers cannot be secured by rule; it is very largely a matter of experience. A sandy soil is often deficient in the essentials of plant food, while a clayey soil contains them in abundance, especially potash. A limestone soil is likely to contain a

considerable proportion of phosphoric acid. What is good fertilization on a given soil for one crop may be very unsatisfactory for another. Where it is the purpose to establish a garden permanently, it will be profitable to determine the need of the soil for fertilization by close observation of results from year to year. It will be well to make notes of important points. Not only will the facts thus gained be useful for future gardening, but they will often find application in the larger operations of the field.

Most soils are benefited by the addition of humus, a name applied to any thoroughly rotted vegetable or animal matter. Humus may be known by burning a small quantity of soil on a red-hot shovel. If it gives an odour of feathers, it contains humus from vegetable matter. Humus forms the richness of nearly all good land, and rarely is there too much of it. In close-grained, sticky soils, which have a tendency to bake, the humus produces a looser texture and a better balance in the retention of moisture. On a loose and leachy soil it brings the grains closer together and promotes chemical activity. At the same time it supplies plant food. Leaves, garden refuse and barnyard manure made into a compost and allowed to decay make good humus. The pile must be turned over several times each year until it is thoroughly broken up into a mass of even texture.

Lime may be very often added to a soil with good results. It corrects acidity, makes clay soil more friable, and holds sand closer together.

The time for putting on fertilizers depends upon the character of the soil and of the fertilizer. Stable manure may be spread evenly over the surface a short time before the first ploughing. It is generally stated that manure should be thoroughly rotted or "short" when applied, but it is considered good practice to haul it directly from the stable during the winter and scatter it on the ground where it is to be used. In this way the liquid portions are more fully available. The principal advantage in rotting manure before applying it is that the rough litter, the straw, etc., is well broken up, and so the mechanical condition of the soil is improved by its application. The crop to be grown must often be considered in determining how thoroughly rotted the manure should be. It must be remembered that it takes more time for vegetable tissue to be broken up than it does for animal tissue.

A valuable means of improving the soil is by growing clover and cowpeas and turning them under. Benefit is also derived by growing peas and beans and other leguminous plants. They collect nitrogen about their roots and it is left in the soil.

Some commercial fertilizers are harmful to certain crops, and care must be taken by inexperienced persons that a wrong use is not made of them. Chemical fertilizers may be applied much nearer the time at which they are to be used by the plant. Bellair, a French authority, says for deep-rooted plants, fertilizers should be put on in the spring before breaking the ground; for shallow-rooted plants, after breaking.

Rhubarb Culture.

The subjoined memoranda on the culture of rhubarb are gathered from various sources of the *Fruit-Grower* :—

" With regard to methods of culture, there are one or two features in respect of this vegetable which deserve consideration if best results are aimed at. Rhubarb is a very easy thing to grow, nevertheless up-to-date culture demands that the needs of the crop be met, and though they are limited, yet careful cultivation will pay as regards rhubarb as well as anything else.

It is a mistake to plant too closely. If we take the Victoria, we find that on account of its spreading nature ample room must be allowed for it. We prefer to have the crowns set 3ft. apart at least when the permanent bed is being made, and if they are 4ft. all the better. It is as well also to see that the crowns do not run in rows opposite each other; that is to say, plant crowns in one row, so that they do not exactly face, but come between the two crowns in the opposite row. Then the crowns, or plants, should not stop in the same place after six years, as a change of soil and the splitting up of the clumps are absolutely needful. If the crowns are allowed to stand in the same position too long the yield will be reduced both in quantity and quality too. By changing the soil and dividing the clumps one can not only increase the yield but the quality of the individual sticks—an important point as far as sales are concerned.

A good thing to induce free, large growth is the supply of liquid manure, made from stable manure and water. This may be given at any time during growth, but particularly when the weather is dry in the spring or growing season. It will be found productive of great benefit if supplies are given after the pulling season is over, as it invigorates and strengthens the crowns in the most marked manner. It is as well to leave some of the leaves on the plant, and not to strip them all off and take them away. The leaves left will decay, and falling upon the crowns, protect and feed them during the winter season.

There is nothing like a mulch of stable manure during the winter and spring months of the year to bring the crop on. The spring mulch will be found particularly useful, especially if frosts or cutting winds are prevalent. Ample supplies of air are, however, needful to start the crowns into early growth, and the sooner the light spring mulch or covering is off the better, as free supplies of warm air act like magic on the crop.

There can be no doubt that where vigorous crowns are grown the culture of rhubarb for local and general sale, particularly where the grower is near a marketing centre and the right kinds are grown, can be made a profitable business.

As far as sorts are concerned there are ample to select from. Amongst some of the best we would name Prince Albert, Victoria,

Linnæus, Paragon, Myatt's Victoria and Red Champagne. These are well tried, productive and good sorts, putting on a good colour and yielding good sticks year after year.

In addition to these we would refer to Hawkes' Champagne, a finely-coloured and excellent variety for commercial use. Dawes' Champion is a fine new sort, and one that will secure much attention in the near future. Victoria, Linnæus and Early Prolific are grand sorts for market work. There can be no doubt that these five kinds will be found ample for most market growers of rhubarb, and we commend them to readers with the utmost confidence. With the aid of mats and manure they will enable the grower to pull successional supplies of good saleable sticks. There are several other sorts that might be referred to, but we think, as these five will answer all purposes, that it will be much better for growers to confine their attention to them. They are of the best quality, and not easily equalled. We think that under the best treatment there is still plenty of room for the cultivation of rhubarb, but we are sure that strong crowns are an absolute necessity.

Raising rhubarb from seed is not so easy as propagation by division, for large quantities of roots can readily be obtained by this method. Still, if it is desired to do so, the following plan is good: Sow the seeds when they are ripe, say, the first week in October,* perhaps a little before. Shallow drills are best for this purpose, say, 3ft. or 4ft. apart. Seeds can also be sown in February.* When the plants come up they should be thinned out 2ft. apart. Then in the next October or February, as the case may be, the plants are transplanted from 4ft. to 6ft. apart, by 4ft., or the seed may be sown and thinned out where the plants are to remain without transplanting. Some claim this as the best method, ensuring, as it does, non-interference with the roots; it will come true from seed. If a good heavy yielding plantation is desired, we ought to say that raised from seed best and most permanent results can be secured. In propagating rhubarb from roots, little skill is needed, if any, though there are one or two points which should be observed in the operation. We have to see that the proposed offset has a bud, and that it has also some root fibres. Independently of these two features, the roots can be cut through as quickly as possible, for the offset thus treated cannot fail to do well after it has been set out in its new position in rows. Most growers favour the slicing process, beeause it saves time and is quickly performed. Propagated thus, an increase of roots is obtained at once without waiting."

Liquid Manures.

In connection with the application of liquid manures the same journal observes:—

"Judiciously applied, manures generally must be admitted to produce a beneficial effect on the soil, provided the manure is really a plant

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* April and August out here.—Ed.

food and suitable to the crops to be grown. Diluted with water, these manures in liquid form become capable of producing quicker effects than when applied in their solid state. It seems as if the growing plants like to obtain their nutriment in liquid form, because, as we have pointed out in various articles on the value of water to the growing crop, the food is rendered soluble, and is thus supplied in an available form suitable for the wants of the plant or tree.

Another point in favour of manure in this form is that it can be applied at any time, and with the certainty of quick effects being produced. Then again, it can be applied in any strength, either weak or strong, and will also produce two effects from the one operation—that is, it will furnish a supply of moisture, also of nutriment at the same time. Further, liquid manure can be applied to the crop at any period of growth. It will thus be seen that from many important standpoints liquid manure is invaluable to growers, and enables them to produce the best possible results in the shortest space of time. Because of the two effects produced by the use of liquid manure, the supply of necessary moisture in times of drought will alone pay for the cost involved in supplying it under ordinary conditions.

Liquid manure is generally made with the use of stable manure principally and water, and in this form undoubtedly fairly good results are readily secured. But the use of liquid manure should not be confined to the products of the stable alone. Commercial fertilisers and plant foods in a more evenly balanced and concentrated form may readily be made to form a good liquid manure, which will be more clean in making, less objectionable in use, and more effective as far as the growth of the plants is concerned. The value of liquid manures is, beyond doubt, of a very high order. They are easily made with commercial fertilisers, occupy a comparatively small space, and can be made ready for use on the shortest notice. All these things tell in favour of a free use of manure in liquid form. True, they have been used for some years—are still used, of course—but to nothing like the extent that their value and usefulness show they should be. Liquid manure deserves to be recognised as an important factor in up-to-date cultivation The more it is used the greater will its value become. Few things pay better, in our opinion, in market gardening, than the free use of liquid manures."

Fruit and Bees.

Fruit-growers in Kent have complained very freely about the number of non-bearing plants that appear in their strawberry fields. There is no doubt that much of the trouble is due to the wanton destruction of bees. Few growers are aware that the pollen of the strawberry is not very plentiful, and that as the plant grows so close to the ground breezes fail to reach the blossoms. There is

therefore more need for bees to visit these plants than any other fruit-bearing plant that can be named. They are indispensable for the production of fruit by fertilising the flowers and acting as pollen distributers. The honey bee is the best fitted for the purpose of crossing, and it is thus clear that in permitting their destruction fruit-growers are acting against their own interests. The suggestion that the honey bee devours the ripe fruits is unjustifiable. It does nothing of the kind. As the outcome of tests it has been proved that the honey bee will even starve to death in the vicinity of ripe fruit. It is certainly to the interest of strawberry growers to protect and encourage them in every way they can. Millions of these fragrant fruits are lost each year through the want of fertilisation by bees.

As the result of a remarkable series of experiments to mark the result produced by bees on Baldwin apple trees, it was found that the cross-pollinated fruits—that is, the fruits from blossoms which had been fertilised with pollen from other trees, by the medium of bees—were not only larger in size, and produced fuller pits, but that the skins were far more highly coloured, and quite different altogether to the small-sized, thin-seeded and faintly-coloured fruits produced on trees which had been self pollinated. These facts, the outcome of careful tests, prove the great value of bees to fruit-growers. They clearly demonstrate that the high colour of certain well-known American apples, usually found upon the English markets, is not due so much to climate as to cross-pollination by bees. It is therefore to be hoped that in their own interests the growers of apples particularly will recognise the important part that the busy bee plays in respect to the colouration of these popular orchard fruits.—*Fruit-Grower.*

Yield and Consumption of Oranges.

It has been calculated that there are in Italy 5,400,000 orange trees which yield on an average 1,600,000,000 oranges per year, or 300 oranges per tree. In the province of Seville, in Spain, where the largest quantities of oranges are grown in Europe, the average annual yield of a tree is 600 fruits. The Island of St. Michael, in the Azores, produces on an area of 265 acres, 350,000,000 oranges, which are almost entirely shipped to England. In 1899 the total exports of oranges from Spain exceeded 1,000,000,000. Greece exported in 1899 some 50,000,000 oranges, and Great Britain consumes annually oranges to the value of about £1,666,666.

The California orange crop of the past year is said to be the largest ever produced. It will supply for sale elsewhere, it is estimated, from 20,000 to 23,000 truck-loads of about 360 boxes each, so that about 8,000,000 boxes of oranges are expected to leave the State.

The Florida crop is estimated at about 1,000,000 boxes. Florida oranges, however, are said to be arriving in New York in not very good condition, owing to the unfavourably warm and rainy weather in that State, and it must be remembered that Florida used to have a crop of about 5,000,000 boxes before the great frost of 1894-5 caused the virtual abandonment of many of the orange groves in the northern part of the State.

French Vintage.

Last year's vintage in France yielded, according to official statistics, 55,212,000 hectolitres—one hectolitre equal to 22 gallons—whereas others estimate it to be 65 millions. In regard to quantity it is only exceeded by the vintages of 1865, 1869 and 1875. C.M.

MISCELLANEOUS.

National Forestry.

(Continued from page 103.)

DECLINE OF BRITISH AGRICULTURE MET BY THE RISE OF BRITISH FORESTRY.

Looking into the future, although little encouragement is discernible for British agriculture, for British forestry the prospects are brighter. The present low price of English timber need not be seriously considered. Its inferiority is admitted on all sides. Its exclusion is specified or implied in nearly all building contracts. Till lately it was legally excluded for building timber under the Lands Improvement Act. British coniferous timber is used only for rough work and is too often a drug in the market. This inferiority has nothing to do with climate. It is solely due to bad forestry. The German and French forest officers who have visited England tell one tale; and there is not a shadow of doubt on this point, that good forestry in England would produce timber equal to any that could be imported. To a forester this is so certain that it need only be mentioned here. A more important point to consider is the diminution, in the future, of supplies from abroad, and the consequent increased demand for home-grown timber. Here English forestry could not wish for better prospects. The vast forests of North America are

disappearing by leaps and bounds. Though much has been written and said about forest conservation, only a beginning has been made in the reservation of the national forests. It is more than probable that forest destruction in North America will not be arrested until no more forest is left than is required for home consumption. The forests or Russia are in similar case. The same may be said of the forests of Sweden and Norway, which are largely in private hands, and are going the way of private forest all the world over. The forests of central and northern Europe will not in future suffice for more than local demands. As regards competition with home timber, tropical forest, and the forests of the temperate regions in the southern hemisphere, may be left out of account. They may send a little hard wood, in spite of the distance, to compete with oak, and for special uses, such as street paving; but remembering the fact that about nine-tenths of all the wood used in civilised countries belongs to the pine or the coniferous class, and that the supplies of this wood come, and must come, almost entirely from the cold temperate regions of the northern hemisphere, it will be seen that English forestry has in the future little or nothing to fear from foreign competition.

Compared with English agriculture English forestry has these two further advantages :—

(1) *The Bulky Nature of Forest Produce.*—Wheat, frozen meat, fruit, skins, &c., can be brought at moderate expense from the Antipodes. But long carriage by sea or very short carriage by land soon renders the cost of imported wood prohibitive. Rafting such as one sees on the Rhine and on the Baltic rivers is out of the question in the temperate regions of the southern hemisphere. In the tropics the rivers are usually fitful, being dependent on heavy periodic rains, and though of course there are navigable and raftable rivers, the number of these in proximity to workable forests is not great. There is the further difficulty in the tropics that most of the woods are too heavy to float and require to be buoyed up with bamboos.

(2) *Cheap Money.*—The low current rate of interest on loans has a beneficial, but only a comparatively small influence on agriculture, where some return on the capital invested is usually obtained within a year or two. In forestry, owing to the long-deferred yield, a low rate of interest on money is an all-powerful favourable influence. Forest estates rarely yield more than 2½ or 3 per cent. The produce per acre runs into big figures, both of yield and money, but the length of time required to obtain this yield reduces to 2 or 3 per cent. the interest on the capitalised value of the estate. The public funds have now sunk to a lower rate of interest than that yielded by forest estates. Consols to-day yield only 2 per cent. I can remember the time when 5 per cent. was usual, and was considered a fair rate of interest for safe investment in England. Five per cent. has since gradually fallen to the 3 or 2½ per cent. of to-day. This steady fall in the current rate of interest on capital and the equally steady destruction of extra-European forests combine to render British forest estates in the future a more remunerative investment. The

fall in the rate of interest tells most in favour of State or national forestry, because (1) it is the State that is chiefly concerned in the production of large timber at long rotations; (2) it is the State that commands money at the lowest rates of interest—to-day 2 per cent.

Thus, although forestry and agriculture are at present in an equally depressed condition in Britain, the prospects of forestry in the early future are as bright as those of agriculture are sombre.

The present bad quality of British timber is solely due to bad forestry. Foreign wood must become dearer, and gradually rise to famine prices. The cost of transporting a bulky material such as timber must always tell largely in favour of home produce. The fall in the current rates of interest on capital renders British State forestry remunerative to-day, for the first time in history.

THE RURAL POPULATION BENEFITED BY THE RISE OF BRITISH FORESTRY.

Land in the British Isles is going steadily out of cultivation; the rural population, the backbone of the country, is steadily declining. To a visitor absent for many years from England, this is quite the saddest feature of modern developments.

As compared with pasture the area under crops in the United Kingdom is an ever-diminishing quantity. In Great Britain about one-half the arable land is under crops. In Ireland there is little more than one-sixth. Though this decrease of cultivated land may represent a small economic gain in the increase of England's unique grass lands, the loss of rural population has a serious national aspect which can hardly be qualified otherwise than as a national disaster. In this statement I think I have with me all those who have seriously studied the population statistics of these islands. To remedy this serious and growing evil there occurs nothing so practical as national forestry.

Dr. Schlich calculates that if the 9,000,000 acres required to produce the present forest imports, were to be planted at the rate of 300,000 acres yearly, at least 15,000 labourers, corresponding to a population of 75,000 people, would be employed; and that at the end of thirty years, when the 9,000,000 acres had been fully planted up, permanent employment in the forest would be given to, say, 150,000 labourers, respresenting a population of 750,000 people. A further large rural population would be provided for by the various forest industries attendant on the formation of forests. I have in my mind a prosperous German hamlet following the happy thought of one man (and he a peasant) to plant osiers. In Germany it is estimated that the wages of people employed on forest industries amount to something like £30,000,000 sterling, and that roughly 12 per cent. of the total population of Germany is employed in the forest and out of the forest. About 1,000,000 people in the forest, *i.e.*, directly employed in working the forest estates, and about 3,000,000 out of the forest, *i.e.*, in working up forest produce, chiefly timber, into the various articles manufactured from wood.

Certain forests are maintained in Germany for the support of certain industries. Without the forest the industries would exist with

difficulty, or go to some other country. The Spessart forest is a case in point. Here is a fine old oak forest deliberately worked by the Bavarian Government *at a rotation of 300 years*. Of course, with such a long rotation there is an enormous sacrifice of interest on the capital locked up in these old trees. But the trees are Durmast oaks of slow growth and very fine grain. A regular supply of this wood is necessary to the well being of important industries in the villages around. So far has the State conservation of these trees been carried that some of the trees now being gradually and methodically worked through are as much as 450 years old. The plan of operations, technically termed the "working plan," was framed in 1888 and runs to the year 2007.

As customary, the whole forest has been made the subject of close examination and careful calculation by a special commission of forest officers. Starting with the postulate of a sustained yield, they have laid down how and when each group of trees is to be felled, up to the year 2007. The very old trees—too old to have any volume or value increment, might now be sold (says Sir D. Brandis in a recent review in "Nature") for about £150,000.

It will at once be said that the maintenance of such trees is utterly opposed to modern principles of political economy. Quite so. The loss of interest on the oldest of them costs Bavaria £27,000 a year. But German public opinion rightly considers that the forests and village industries are worth this, and more also.

PHYSICAL DEGENERATION OF THE RACE.

The prudent foreigner, looking across his wooded mountains, will tell you that England is rich and can well afford to pay in the future for her present forest improvidence. There is more than this in the forest question, and to my mind it is quite the saddest aspect of it.

Great Britain now pays about £20,750,000 annually for imported wood and forest produce that could be produced equally well in the British Isles. Broadly speaking, this wood is paid for by manufactured goods produced by the labour of the factory operative, that physically degraded type of humanity one sees in all big manufacturing towns. With the destruction of the forests in England have gone the stalwart men who once worked in them; to be replaced by the factory hand—weak-lunged, knock-kneed, and sallow. One has only to travel through the forests of the Continent of Europe and then visit a few of the large manufacturing towns of England, to have this physical degeneration of the race brought home in the most forcible and unpleasant manner. The wood industries are mostly healthy (to a great extent out-of-doors) occupations, and they usually employ a robust country population living partly on the forest and partly on their gardens and small agricultural allotments. But let us consider the one million people that in Germany live and labour in the forests. What a reserve of national strength! They are fairly, most people would say sufficiently, educated; and their healthy life in the open air and constant exercise preserves a physical development, a strength of frame and constitution, that is rare in

these days of machinery and easy chairs! Judging from what I saw at a recent visit to the forests of Germany and the big towns of England, I should say that England could better afford to pay £20,750,000 for foreign wood than to lose the broad-shouldered and muscular men who once worked in her forests. These are the men whom we value as colonists—men fit ed to go forth and subdue the waste places of the earth.

Not long ago an old Cape Colonist remarked that the Englishman of to-day was only fit to drive a steam-engine. From a certain point of view there was truth in the remark, and no doubt the steam-engine has had something to do with that degeneration in the frame and sinews of the race that is sufficiently remarkable. Town life and modern athletics are producing—at least, so it strikes an "Uitlander" —a small race, sprinkled, doubtless, with a percentage of active, wiry men. But the big men of square frame and massive strength are increasingly rare. Few inquiries would be more interesting than a comparison of the average muscular power of the men and women of to-day with, say, Edward III.'s archers. How small a percentage of English women nowadays know aught of healthy out-door labour. One is immediately struck by the difference on going to Scotland. The modern English woman considers out-door labour in the field and garden a disgrace. Just as the effeminate clerk looks down on the artisan, so does the sickly, shrunken household drudge on her brawny sister of the field—would I could say, and forest. The charm of Hardy's shapely "Tess" lay in her old-world out-of-door life. The graceful, shapely Kaffir woman loses her form and amazing constitution when she adopts English habits and ceases to labour in the field.

It is a curious fact, and one that affords food for much reflection, that the European who came to South Africa 200 years ago is, in frame and bulk, the physical superior of the average European of to-day. In spite of a warm and somewhat enervating climate, he has escaped the dry rot of town life. Put him to work in the field with the German or Italian peasant, and he is soon distanced. Put him behind the counter. He is not smart. But stir him up with an average European crowd, and his sturdy buil'd betrays him at a glance.

Thus we see that national forests have an important bearing on national health and the physical degeneration of the population. To the town-dweller, national forests will supply public parks and recreation-groumds; to the countryman a means of livelihood in the country.

Forests as Recreation-grounds.

The national forests contemplated above, viz., 9,000,000 acres required to produce at home the timber now imported from abroad, would amount to an average area of about one and a half New Forests to each county. These would be national forests, and, in every sense of the word, national playgrounds; as are the national forests on the continent of Europe. Such forests spread over the

length and breadth of the land would be the pride of every county. As public property they would be open to everyone, for everyone's use and enjoyment. Their important bearing on the health and enjoyment of the community needs no comment.

Let no one take fright at the mention of the New Forest. The management has been compared to that of a pilot endeavouring to sink his ship, and if one may believe what has recently appeared in the public prints, there may be a good deal of truth in this playful comparison.

In any system of national forestry the State forests would be entirely free from those servitudes that have been allowed to grow up and nearly ruin the New Forest. There would be no walled-in enclosures, no part of the forest where every one could not go and enjoy God's earth in its wildest and most beautiful aspect to his heart's content.

Military Aspect. Forests a Means of Defence.

It is certain that forests in England would assist defence in case of invasion. In a forest disciplined troops are at a disadvantage. This has been seen in every Kaffir war in South Africa, only too sadly in the fighting with natives more recently in the Matoppo Hills. In the Pirie forest a handful of ill-armed fugitives kept at bay a powerful English army well found in artillery and native auxiliaries. Here discipline was not only useless, but worse than useless. In the forest the colonial irregulars and native levies had actually to fight for and protect the regulars. It is chiefly from behind cover that the Boer marksmanship is described as being so wonderfully accurate. The ancient forests of Britain gave Cæsar as much trouble as the ancient Britons. Forests played an important part in the American war of independence. It was largely by their aid that the raw colonial levies beat back the best disciplined soldiers of England. It is unnecessary to multiply examples. History is full of them. Forests, especially when the defenders have with them men who know the forest, always assist the defenders.

We have seen above that a scheme of national forestry would give employment to 150,000 men in the forest. No doubt these would be incorporated into a militia or volunteer corps for national defence. It is easy to see how invaluable such a corps would be in case of invasion. With a forest and foresters in every county, Great Britain would be studded with well-garrisoned fortresses. Forest, in these days of sharp-shooting and accurate rifles, helps the defenders far more than in Cæsar's time. The foresters in France and Germany form a valuable military adjunct, where every man is trained as a soldier. How much more would they be worth here, where, in case of invasion, every disciplined man able to shoot, march and camp out, would be at a discount. A forest militia, too, would help the solution of that difficult military problem, what to do with the army reserve men.

No doubt the navy is our first line of defence, no doubt the people

would rise as one man if invaded; but no prudent man would wish to see this wealthy country with only one line of defence ready. Consider the rich prize of London, the possibility of a naval reverse and a dash on the metropolis. There has been no naval conflict between first-class powers with modern ships and guns. Here is an element of uncertainty. A large proportion of our seamen are soaked in malaria contracted on tropical service (notably the moral slave-hunting fad on the east coast of Africa, and the immoral gin protection on the pestilential west coast). Malaria never quite leaves the subject. It lurks in him, and is liable to prostrate him at any crisis involving unusual fatigue or exposure. Our malarial seamen would be unfairly pitted against non-malarial seamen. Then again the elements are proverbially fickle. Storms might interfere with our torpedo destroying arrangements. Two or three "mill pond" days might land an enemy on twenty points of our coasts. Every consideration of prudence demands a second line of defence *always ready* behind the navy. In the Franco-German war the Vosges mountains and forests were France's second line of defence, but the French were not ready to defend them and the Germans took them at a rush. In the last Russo-Turkish war, the Balkan mountains and forests were Turkey's second, and for long successful line of defence. Could the small regular army maintained in England cope with a sudden invasion at twenty different points? We doubted this in Napoleon's time. With the present huge continental armies and their growing navies there is still more reason to doubt it now!

It would seem advisable therefore to incur some comparatively small extra expenditure on a forest militia and the grouping of the national forests so as to form a second line of defence round vulnerable or strategic points. Thus London would have its cordon of forests and forts. Part of the extra cost of land near London could be set against the gain to the population of such grand national recreation grounds.

GAME.

Game and the fortuitous value it gives to waste and otherwise unproductive land has long been held to be an obstacle to forestry in Britain.

It was game that depopulated the Highlands of Scotland, and drove to Canada and elsewhere a race of men and women that should have been nurtured at home. Britain is the poorer for their loss, but Londoners have been saved the trouble of going abroad for their deer shooting, and our Highland regiments are recruited in Glasgow!

As regards game and forestry, I do not share the opinion of those who consider game and game-rents such a serious obstacle to forestry in the British Isles. The private landowner will prefer game to forestry because it pays him better, or, at any rate, sooner; but the private landowner is not of much consequence in forestry. His forest, as a rule, is badly managed, and in process of disappearance. Certainly, there are brilliant exceptions to this rule, in the Scotch

Highlands themselves and among the German princes; but the general rule is undoubtedly true that in any scheme of national forestry the private forest is not of much account.

It is probable that in large national forests the loss of the present game rents would be little felt. Large game, such as one has in Germany, would come in with the formation of extensive forests. Wild boar, deer and capercailzie would replace the grouse, barn-door pheasants, and battues of to-day. I doubt whether even the balance at the poulterer's shop would, after a few years, be much to the bad. To the sportsman the change would mean a return to more genuine sport. Nowhere is game more keenly and successfully preserved than in Germany.

National Forestry should be Undertaken now as a National Insurance.

Scientifically-managed national forests would yield a percentage return on their cost higher than the present rate of interest on Consols. In other words, such national forests could be formed to-day at a profit, and they would hereafter represent a perpetual and permanent source of national wealth. The wealth and strength that Germany draws from her forests are astonishing. One passes through villages where the people live free of rates and taxes, with perhaps a spacious school-house or public library thrown in. All this "comes from the forest," they tell you. The German forests, as we have seen, are valued at nearly £900,000,000 sterling.

A country's forests rank with its soil, rainfall, population, minerals, accumulated wealth, and other assets, to raise or lower it in the scale of nations. The mineral wealth of England is being rapidly worked out. It cannot be restored. The forests have been worked out, but they can be restored. It seems difficult to imagine any point in the country's history more favourable than the present for restoring the forests. So good is the national credit, that money can be borrowed at 2 per cent. In the total tonnage of its shipping England bulks half as large again as the other eight great Powers combined. Other countries pay Englishmen about £100,000,000 yearly as interest on loans. The financial position of England is to-day supreme.

It would be unhistorical and foolish to imagine that this supremacy can always last. Germany, America, and perhaps Japan seem advancing more rapidly than ourselves. It is possible to imagine them overtaking us, underselling us, outbidding us. Now, in the days of our financial supremacy, is the time to restore the forests, to effect a national insurance against less prosperous times. To restore the forests would be to make the soil of Britain worth more by £150,000,000 or £200,000,000 than it is to-day. Trade might seek other channels, minerals become exhausted, the populace decline in energy and strength, the colonies fall away, but the forests would remain an unfailing source of national wealth, a livelihood for a large part of the physically best part of the people. We are paying off the

national debt, we encourage national thrift in the Post Office Savings Banks, the growth of life insurance is remarkable; but national forestry is looked on as unnecessary. Is England to follow in the footsteps of Spain, Italy and Greece, where the forests were neglected in prosperous times, and the people had to take to hovels as soon as they became too poor to pay for foreign timber? Their deep poverty prevents them restoring their forests now, though they are fully alive to the necessity of doing so, and the loss of their forest enhances their poverty.

Germany, Austria, France and Switzerland have their national forests scientifically managed. Britain, alone among the great Powers, allows this vital question to sleep. The sooner the position is realised the less will be the cost of retrieving it, since we are paying yearly £20,750,000 for foreign wood that could be equally well produced in these islands.

Lastly, when considering forests in the light of a national insurance for England, there is the curious fact that along with England's financial supremacy has come agricultural depression and the fall in the value of agricultural lands. These two facts taken together indicate the present as a unique period in English history for inaugurating national forestry.

Cost and Yield of National Forests.

In considering the returns to be expected from national forests it is easy to get astray in matters of detail. It would be unsound to generalise from figures drawn from private forests. It is particularly unsafe in the case of plantations, where the conditions vary so largely. Cost of land, cost of young trees, cost of fencing, the market, are necessarily very variable items in each case. We may learn that the very best land for planting in Scotland may be had for 50s. per acre, and that it can be fenced, drained and planted for £4 per acre, that some plantations in Scotland are scarcely paying expenses, that other Scotch plantations are yielding fair returns, that larch plantations in South Wales are paying handsomely for pit props, that good agricultural land in England is rarely obtainable under £20 or £25 an acre, and is commonly worth £60 or £100 per acre, and there is sandy but good planting land to be had in Surrey for £8 an acre. On the whole, we may, perhaps, assume an average value of £10 per acre for the land required for reforesting, and £5 per acre for planting, fencing and draining. Thinnings would have little value in remote localities. Near London and centres of population every stick would be marketable. Approximately, and on an average, we might assume that the value of the thinnings would cover the cost of administration up to the epoch of the principal cuttings.

The returns for 1896 give the value of imported timber producible in Britain as over £20,000,000. Let us consider what would be the cost and profits of planting 10,000 square miles, calculated to produce about £12,000,000 worth of timber annually.

Let us assume an annual vote of £1,000,000 expended in buying

ground, fencing, draining and planting 66,666 acres, or 104 square miles yearly at £15 per acre. This is calculated to yield timber and forest produce worth about £13,000,000 now, and, say, £16,000,000 in 73 years. Let us assume a rotation of 73 years. An expenditure of £1,000,000 now, would, at 2 per cent. compound interest, quadruple itself in 73 years. In 73 years, therefore, the capital of £1,000,000 would amount to £4,000,000. Thus on a 2 per cent. basis, with an expenditure of £4,000,000, we obtain timber worth £16,000,000.

If we assume £8,000,000 as the net value of tha wood in the forest, that leaves a profit of 100 per cent., or (looked at another way) a return of 4 per cent. on the capital; but in any case the whole £16,000,000 would be spent in this country on the wealth and health of its people.

To reproduce the woods after the first rotation, natural reproduction would no doubt be largely employed; and the value of timber tending to rise, and consols to fall, the national forests would probably yield 5 or 6 per cent. at the next rotation.

The German forests actually return now from 2½ to 5 per cent. on their capital value.

Abatement of the Smoke Nuisance.

One of the results of national reforesting in England would be an abatement of the smoke nuisance of towns. Let anyone compare the thin blue smoke, almost vapour, from a wood fire with a dense black sulphurous smoke from a coal fire. No doubt the smoke from wood fires varies much, and some forms of coal burn almost without smoke. If, however, we consider the average combustion of clean, well-seasoned firewood, and ordinary descriptions of coal, there is a vast difference in favour of wood. For many years I have held that herein lies the chief key to the difference between clean, bright Paris and grimy London. About 25 per cent. of the country round Paris is wooded. Consider the fine forest of St. Germain within ten miles of Paris.

If London were in such case, the necessary thinnings from the forest would furnish the poor with a firewood cheaper and more wholesome than coal, while in the dwellings of the rich, wood would be preferred on account of its cheerfulness and freedom from dirt. No doubt, to get sufficient heating power from wood, it would have to be used as it is on the Continent in suitable stoves. These may be close, with great heating power as in Russia and Germany, or open, as in Belgium and parts of France. In either case there would be a great gain of heating power over the present dirty open fireplaces. No doubt it is the combination of watery vapour and smoke that produces London fogs, and that the condensing watery vapour, especially during winter, must always be present in London. But I am convinced that the substitution of wood fuel for coal would give London a greatly improved atmosphere.

Reasons against Delay.

Let us briefly recapitulate the reasons against delay :—

1. £20,750,000 spent every year for wood that could be equally well grown at home.
2. Consols at 2 per cent.
3. Shrinkage in foreign sources of timber supply.
4. Fall in the value of land in Britain.
5. Livelihood for the country population.
6. Recreation for the towns' folk.
7. Aid in defending the country against invasion.
8. National insurance.
9. Abatement of smoke nuisance in towns.

It may be objected that much of what is here set down has been heard before. Private forestry and its failure in Britain is no new story. But I do not know that the claims of national forestry have ever received the consideration they now merit, nor indeed could they. It is only within the last few years that the financial position of national forestry has become assured. When I studied in the forest schools of Europe a quarter of a century ago, national forestry for England was not possible as a paying concern. To-day the country can borrow at 2 per cent. National forests will return 3 per cent. and upwards.

Pondering these things, the conclusion to a Colonist and a forester is irresistible. England's great want at this time is national forestry. And as one reckons up the gains—£20,000,000 more produced yearly in the country; 750,000 people kept on the land; a forest playground for every man, woman and child, with a fostering of the love of nature and the beautiful; less smoke: when one considers that this can be produced at no final cost to the public exchequer (probably a considerable gain), and that for a moderate extra cost we obtain strategic forests and a defensive forest militia—pondering, I say, these things, the strange puzzle of the present position becomes stranger and stranger.

Grass and Bush Fires.

The rapidity with which fires spread, and their often ruinous effects, are too well known in this country, as well as the necessity of plans for their prevention and control. A correspondent of the *Australasian* calls attention, with notes of warning and suggestions, to the need of controlling and limiting these destructive conflagrations in the following manner:—

"It may seem paradoxical to remark that bush or grass fires are the dark spot in every year that is bright with agricultural and pastoral prosperity; but odd though the metaphor may read, it is a fact that very many years of plenty in the provincial districts of Australia have, because of that plenty, been converted into years of disaster through devastating fires, which have spread over hundreds

of square miles of territory, sweeping grass runs, crops and homesteads into blackness and leaving desolation and ruin in their wake. In years of grass scarcity the risks from these wide-reaching fires are comparatively small; in years like the present, with herbage abundant on every hand, the dangers are greatly increased, hence a word on the subject will be well-timed at the present moment.

The oft-repeated warning to persons living in country parts should not be necessary to-day, for all are aware that extreme caution is an essential even to moderate safety, actual immunity from grass fire troubles being apparently out of the question. Comparative safety, therefore, can be bought only at the price of great care, and, while it may not be necessary to emphasise this well-known and generally acknowledged fact, it is worthy of a mention in passing that the incoming summer season will possess dangers greater than usual because of the abundant supplies of grass everywhere. When herbage is light, a fire can be fought with some hope of success; when heavy, as it is now, and when dry, as it will be in six or eight weeks' time, an outbreak is very likely to defy all human effort until such time as it has swept the board and burned itself to a finish. A fire is a something to be dreaded when the fuel is plentiful; a word of warning should therefore be heeded when offered.

"It is too late," says the proverb, "to sharpen one's sword when the bugle calls to battle." It is also too late to commence to erect such barricades against the fiery foe as I am about to suggest when the time the foe may be expected is but a few weeks ahead of us. Practically fires cannot be prevented from occurring in every summer season in nearly every district, whether care be exercised or not, hence the only sensible way to look at this matter is to commence to sharpen one's sword well in advance of the prospective battles, and thus be in a state of constant preparedness. The best barricades to erect against grass fires are fire-breaks. Of these there are several descriptions, to wit, timber belts, fodder belts and ploughed strips. These may be considered in detail, dealing with the last-mentioned first.

A strip of ploughed land on certain boundaries, or all round a holding, means a waste of ground, according to the number of acres sought to be protected. In a very large estate the aggregate area of land lying idle would be considerable, but at the same time such waste is nothing in comparison with that caused by a fire, hence to use the plough or scarifier judiciously at the present time of year is a course which may be strongly recommended in all cases where extreme danger from outbreaks will exist in the summer season. An on-coming fire can be partially arrested and weakened in its fierceness by even a badly scarified strip, and absolutely stopped if the treatment of the land be such as to remove all inflammable herbage on the area operated upon. This method is the only possible one to adopt thus late in the season, and therefore is worth mentioning first in the list by way of emphasising the value of this, the only precautionary action possible at this late hour. At best, however, the ploughed or scarified strip is but a temporary system.

Of the other systems mentioned, one only of which is permanent, it is worthy of remark that belts or strips of green fodder, though not of lasting value, are deserving of special attention on the grounds that they yield sustenance for stock, while serving as a fire-break, and are to that extent at least more valuable than ribbons of ploughed ground which are unproductive. "The best kind of crop to sow for arresting grass fires," remarked a Riverina grazier a short time ago, when referring to this matter, "is sorghum or amber cane. These crops are generally green when all other herbage is dry, and do not commence to die off and ripen until the most critical time of year is over. Furthermore, the canes, being full of moisture, do not burn readily, and they constitute a valuable aid to the fire-fighter." Lucerne stretches, it is pointed out by another holder of a large estate, are an even better fire-break than a cane crop, because the plants never become dry enough to burn, and are consequently a perfectly reliable barricade to a fire at any time of the year. Other fodders valuable for the purpose under notice are Johnson grass, which is leek-green through the hottest and driest summer, and salt bush. Both are good fodders, and will grow well in many districts, the former being eaten most readily if never allowed to grow big and rank. The month of November, it must be admitted, is not quite seasonable for a dissertation upon the planting of fodder crops, but the question of fire-fighting is very much of a live one on the edge of a summer which will produce its usual bulk of disaster if great caution be not displayed, and it is possible that those who care to be instructed, or advised, or warned, will possess enough power of retention to bear in mind those of the foregoing remarks which seem to them sound and reasonable, ultimately bringing those remarks to bear upon their operations when the proper season arrives.

Timber belts, though mentioned last, are by no means of the least importance in this connection. Indeed, they possess a value the other methods do not, and are to be recommended in preference to them in many districts. Suitable trees, such as native gums and peppers, grow rapidly and are health-giving. They afford shade for stock in the summer, and shelter from cold winds and rain in winter. They beautify the landscape, modify devastating gales, and constitute a fire-break whose stopping power is unsurpassable. The day will come in Australia when millions of acres of unused corners and boundary lines, as well as waste lands, will be covered with health-giving, sheltering clumps and belts; but that time is not yet. The people of Australia have not yet begun to recognise the value of timber as an adjunct to the farm and station, and as a conserver of the moisture of the earth and the atmosphere, which, on being given off by the exuding foliage, render the air humid and nourishing to plant life for miles around. The people of Australia have but denuded the forests nature has endowed their country with, forgetting, in their wild wielding of woodman's axe and their anxiety to ring-bark and burn off, that they were impoverishing their land at the rate of thousands of pounds sterling annually. But a new day

will dawn. A wiser generation will appoint instructors in forestry and arboriculture, and the immediate result will be timber belts, and clumps, and forests, ornamental plantations, and plantations for stock shelter purposes, and a general recognition of the fact that trees are of immense value in a score of different ways, not the least important of which is their exceeding worth as an aid to the fire-fighter."

Wire Fence Telephones.

The utilisation of wire fences for telephones, as we have done in some parts of Australia, is becoming quite a common practice in some extensive districts of the United States, and often the top barbed wire of a fence is employed for this purpose. One of these lines in the State of New York is described as 15 miles long, and it crosses railways and highways 37 times. Some of these crossings are effected by carrying an insulated wire underground in a pipe, while other crossings are made overhead as with us. In places where it is deemed necessary, the posts and the wire are painted with rubber paint for insulating purposes. In Oneida, which is a thickly-populated farming district, there are 30 of these private telephone lines, having connection with 500 different farm-houses, and nearly all these can be connected by means of switches. As there is no mention of any payments being made to the Government for the right to cross roads and railways, we may suppose that no official bar is put to free telephone intercourse among the rural inhabitants. On large pastoral properties, telephone communication with the outlying stations and the woolshed is almost indispensable, and in case of a bush-fire occurring, if two or three properties are in telephone communication, the position of the fire can be exactly located. While visiting the properties of the Messrs. Kinross Bros., near Germanton, lately, I was mnch struck with the value of the telephone in the management of the four adjoining properties, which are worked as one. The saving in horse-flesh and time is worth 20 times the cost of the telephones. The owner of a large stud herd, or flock, who has no telephone connection with a telegraph-office, is placed at a considerable disadvantage. To judge by the impediments that have been placed in the way of forming these bush telephones, it would appear as if the Government wished to discourage their use. I feel satisfied that a telephone system will, in a few years, form part of the plant of every large pastoral estate, and every farmer who "keeps up with the procession" will also have a telephone to keep him in communication with the outer world. As an American writer very justly puts it:—"More work of a certain kind can be done with the telephone in ten minutes than the best trotting-horse can do in half a day."—*Australasian.*

Rearing Young Turkeys.

The *Australian Farm* gives the appended useful hints on this branch of poultry farming:—

"We will go back and fix the nest to hatch the young in; the eggs always hatch better when the nest is made on the ground with dry leaves or grass. This is the turkey's way of making it when left alone, and if she is not disturbed the eggs will hatch well; but sometimes rats, foxes, etc., carry away the eggs and destroy them when left alone this way. Where this is the case, we use a barrel turned on its side; in this make a nest of earth three inches deep; on the top of this cover with leaves and dried grass, leave the barrel open at one end for the hen to pass in and out to get food during the day; at night have a broad plank to close the opening to protect the hen and eggs from danger.

The earth should be kept moist by sprinkling every few days, or when needed. Aim to keep it as near as possible like the ground if she had built her nest the natural way. In this way the eggs will hatch better, the young turkeys will not die in the shell, and they seem stronger when first hatched. After the little turkeys begin to chirp and come rolling tumbling out of the shell, remove them from the nest as fast as they are hatched, and place in a warm box by the fireside until all are hatched; this prevents the hen from trampling them to death before all the eggs are hatched.

When the hen is ready to take from the nest place her in a pen or small yard with the young ones. Have the pen so the little turkeys can run in and out (they will not go far), but keep the old hen confined for a few days until the young ones are strong enough to follow on her long rambles she takes after different kinds of food. They must be protected from the morning dews, and not let out until the sun has dried the grass. When strong enough the hen can be given free range, but should be driven up every night, and they soon learn to come home every night and go to the right place for them."

Dubbing for Harness.

The following emulsion for harness was discovered some years ago (says the *Breeder and Sportsman*) by a farmer in San Jose. He gives the following directions for making the emulsion:—"Take one bar of good strong washing soap, dissolve in a quart of water, and bring to boiling. To this add one pint of kerosene oil, and stir; beat and churn the whole until it combines into a creamy emulsion. Have a tub of warm water, in which mix the emulsion, and into this place the harness and let it soak some time; then with a stiff brush rub and brush the straps thoroughly, and they will come clean very easily.

Let it dry a little, until dry on the outside, and then apply the harness oil. I use either neatsfoot or fish oil, and I think the fish oil is just as good. I mix about one-fifth kerosene with the oil and then give the leather a good oiling. To make it black mix a little lamp-black with the kerosene and mix it with the oil. In fixing leather carriage tops I find it necessary to wash over several times with the emulsion to get it damp enough to oil; then apply the oil as in the harness. I find old straps which have become so brittle as to crack seriously when bent are restored to their original softness and pliability by the treatment. If a new harness is treated twice a year in this way it will always keep soft and in good order."

CORRESPONDENCE.

Pure Linseed for Feeding.

Can one use *pure* linseed for feeding and fattening purposes with cattle instead of the cake, and if so, which is the best way of doing so?

(1). As it is, (2) scalded, or (3) ground and mixed with something else, and (4) what would you advise that "something else" to be?

BLAKEBROOK.

Caledon, December 28th.

Crushed linseed is occasionally used for feeding sick or prize cattle but it is much less economical than cake. It must be crushed, or some of the whole seed will pass through the animal undigested.

Crushed linseed is mixed with two equal parts of bran or with good chaff. Large quantities of linseed are used for feeding calves. It is scalded and then mixed with skimmed milk to supply the place of the butter fat taken out by the separator. One pound of linseed contains about the same quantity of oil as a gallon of new milk does butter fat. About 5½ ounces. Scalded linseed could, of course, be used in mixing off with any kind of stock food suitable for the purpose.—EDITOR.

Lucerne in Orange River Colony.

Will you be so good as to give me any information as to the growth of lucerne in the Orange River Colony? Will it grow on the grassy plains, where the earth is of a peaty nature; say in the district of Bloemfontein? Has it been tried?

D. M.

Worcester, January 30th.

Can any of our readers say?—EDITOR.

GOVERNMENT NOTICES.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rietti Seed Wheat.

In connection with the reports published in the *Journal* of the 20th ultimo [No. 13, vol. xvii., p. 783] upon experimental sowings of Rietti Wheat, and with reference to the remarks made by Mr. Visser concerning the rust-resisting qualities of this variety of wheat [see p. 758 of *Agricultural Journal* No. 12, vol. xvii.]; endeavours were made by the Government to procure a supply of fresh seed from Europe, for further trial.

As at present advised, however, only a small consignment can be obtained, which will be landed in a few days' time; and it has been decided to issue this wheat to applicants on the usual terms, viz: No more than 100 lb. to be issued to any one person; the recipient to pay a deposit at the rate of 10. per 100lb., which deposit will be refunded to him upon receipt of his report, in due course, upon a printed form supplied by the Agricultural Department, as to the result of the experimental sowing. The cost of railway and other transport from Cape Town must be borne by the applicant.

As the quantity of seed available for distribution is very limited, applications must be sent in not later than the 18th FEBRUARY, 1901, and must be addressed to the Under Secretary for Agriculture, Grave Street, Cape Town.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter procced on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of...
Place to which Cattle are being sent..........................
(Signature)...
(Address)...
Date.............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature...
(Address)...
Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.: —

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent........................
(Inspector's signature)..
(Address)..
Date...................

Notice to Fruit-growers.

The Board of Horticulture, having deputed Mr. P. J. Cillie to visit during this season the Western Fruit Districts, with a view to framing a list of varieties suitable for cultivation in the different parts, hereby invite the assistance and co-operation of ruit-growers by affording Mr. Cillie every facility and supplying him with the desired nformation.

C. Mayer, Acting Secretary.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

Destruction of Wild Carnivora.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(a) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(b) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal suffering is from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Sugar Beet Seed.

Enquiry having been made at various times for seed of the variety of Beet used for the manufacture of Sugar, a small consignment has been imported by the Government, and applications are now invited from persons desirous of making a trial of Sugar Beet growing.

The quantity of seed to be issued to any one person is limited to one pound (1 lb.), and a small charge of 1s. 8d. per lb. will be made unless the recipient undertakes to furnish this Department with a report in due course, giving full particulars as to growth, yield, soil, etc.

Applications, addressed to the Under Secretary for Agriculture, Cape Town, will be received up to Thursday the 28th February, 1901.

Show Fixtures.

*Elliot Agricultural Society, April 10th, 1901.
Indwe Native Agricultural Society, March 1901
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.
Western Province, Rosebank, 21st and 22nd February, 1901.

* The Elliot Agricultural Society has decided not to hold any Show this year.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£	s.	d.		£	s.	d.
Bran		4	17	6	to	5	6	0
LINSEED CAKES.								
London made	ex mill	8	7	6	,,	8	10	0
American, in bags	ex dock	7	10	0	,,	7	12	6
Russian, in mats	,,	7	17	6	,,	8	0	0
Calcutta	ex wharf	7	8	8	,,		—	
COTTONSEED CAKES.								
London made	ex mill	4	17	6	,,	5	0	0
Decorticated	ex dock	6	17	6	,,	7	0	0
Meal	,,	6	15	0	,,		—	
RAPE CAKES.								
East Indian Seed	ex mill	4	15	0	,,		—	
Ravison	,,	4	10	0	,,		—	
MAIZE.								
Germ Meal (American)	ex dock	5	5	0	,,	5	6	3
Germ Meal (English)	ex mill	5	8	9	,,	5	10	0
RICE MEAL.								
Rangoon	ex dock	4	8	9	,,	4	10	0
Locust Beans		5	6	0	,,	5	12	0
,, Ground		7	0	0	,,	7	6	0
English Linseed, per qr. 416 lb.			—		,,	3	0	0
MANURES.								
Nitrate of Soda						8	10	0
Bone Meal						4	10	0
Superphosphate, 36 per cent.						3	0	0
Basic Slag, 38 per cent.						1	17	6
Kainit, 23 per cent. Potash						2	10	0

Mark Lane Express, Dec. 31st, 1900.

AMERICAN PRICES.

	£	s.	d.
Bran, per ton 2,000 lb.	3	12	0
Linseed Cake ,,	5	15	0
Cottonseed Cake Meal, per ton 2,000 lb.	5	8	0
Mealies, per bushel 60 lb.	0	1	11
Barley ,, 50 lb.	0	2	1
MANURES—			
Ground Bones, per ton 2,000 lb	4	12	0
Kainit ,, ,,	2	18	0
Florida Rock (Phosphate)	2	0	0
Nitrate of Soda, per 100 lb.	0	7	9

New York Journal of Commerce, Dec. 24th, 1900.

THE

Agricultural Journal.

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Corrections

The article on "The Increasing Consumption of Mealies," in our previous issue, was taken from *The Journal of the Board of Agriculture.*

On page 142, under "South African Horse-sickness," omit "Edinburgh" after "Royal Society."

AGRICULTURE.

Reports and Prospects.

Butterworth, *Jan. 5th.*—November: Drought still continuing and swarms of locusts hatching out all over the district. Towards the end of November rains began and ploughing was begun. Grass very scarce but stock in good condition. December: Rains continuing, over nine inches falling during this month and the end of November. Pasturage in splendid condition and ploughing being vigorously carried on. All swarms of locusts vanished. Foodstuffs very scarce and Natives purchasing imported grain largely.

(*Unsigned*).

Cofimvaba, *Nov. 30th.*—The drought still continues with excessive severity, and mortality among all classes of stock has been very heavy. Little or no ploughing has yet been done. Millions of locusts are still to be found in all parts of the district, and, although the Natives turn out to kill them, fresh swarms are continually making their appearance. The chief food supply among Natives is imported maize, which commands a ready sale at £2 per bag. There is pratically no pasturage, and the greater part of the stock still alive have been moved to higher veld. The outlook at present is gloomy. *Dec. 31st.*—Since my last report this district has undergone a considerable change; quite 8 inches of rain fell during the present month, and the whole country looks fresh and bright. Ploughing and hoeing is being carried on very extensively. The new grass is already making great improvement in poor stock. The Natives are nearly all sowing imported grain, as they have no seed of their own left. The district is free from disease among stock. The demand for horses for Imperial Government service continues; some 300 horses must have been sold out of this district during the year. Native labour is still plentiful. J. ROOSE, A.R.M.

Elliot, *Dec. 31st.*—The prospects for the winter are considerably improved since my last report, good rains having fallen all over the district. The farmers are now reaping, but the crop is very small. Sheep and cattle are in very good condition, and the farmers are nearly all busy ploughing. J. CUMMING, R.M.

Elliotdale, *Jan. 7th.*—November: During this month heavy and seasonable rains fell, greatly improving the chances of good crops next harvest. The Natives took advantage of this and cultivated large tracts of land, sowing mealies and Kaffir corn. The pasturage, which had become very dry, has assumed a green tint once more and stock of all descriptions are getting fat. No locusts were hatched in the district and none came in from elsewhere. December: This has been a very good month in every way, heavy and drenching rains having fallen, enabling the Natives to sow a larger quantity of mealies and Kaffir corn than they have done for years, and if the rain continues to fall at seasonable periods there is every prospect of a large harvest. Already in many parts of the district the mealies and pumpkins are being used for food. The veld is in excellent condition and cattle and sheep have greatly improved. Scab is being rapidly eradicated. No disease has been reported. Locusts have made their appearance on the coast, having come from Pondoland, but happily they are doing no damage owing to the abundance of green grass, which they seem to prefer to mealie or Kaffir corn plants. Mr. Soga has been using locust fungus with excellent results, and besides they are dying in thousands from disease. B. WHITFIELD, A.R.M.

Flagstaff, *Dec. 31st.*—The past month has been most favourable for agricultural pursuits, and the Natives have tilled their lands freely. The pasturage is excellent and all stock are in good condition. J. REIN, R.M.

Idutywa, *Jan. 3rd.*—Nice rains have fallen during the month and the pasturage has consequently greatly improved. Although the rains fell so late yet a good deal of ploughing has been done and is still going on. There are no locusts in the district just now. F. BELL, R.M.

Kentani, *Jan. 6th.*—November: Good rains have fallen and the Natives are busy ploughing. Many, however, are short of seed, which Government intend supplying. Pasturage good and prospects fair. Great scarcity of food prevails. Stock in good condition. No young locusts, but a few swarms of flying locust have made their appearance along the coast. December: Crops are looking well since heavy rain which fell recently. Springs and rivers have been replenished and every prospect of a good season exists. Stock in good condition. One case of lung-sickness reported during month. Great scarcity of food still exists, and many families amongst the Natives are on the point of starvation. The seed-grain supplied by Government has enabled those who were short of seed to plough their lands. N. THOMPSON, R.M.

Libode, *Jan. 3rd.*—There is very little of importance to add to my report of the preceding month regarding this district. A heavy rain set in during the early part of the past month and continued for about four or five days at a stretch, and its appearance was welcomed by all. More rain has fallen here during the past month than has been the case with any month during the last two years. The veld is in splendid condition here at present and all kinds of stock are looking well and at their very best. There is no disease of any kind prevalent in the district at present amongst stock. There are still a few locusts to be met with in different parts of the district, though they are more numerous in those parts nearest the coast, and if only this pest can be eradicated there will be every prospect of a very good and abundant harvest this season. J. GARNER, R.M.

Mqanduli, *Jan. 8th.*—The Native crops look excellent and give promise of the best harvest for years. In the meantime there is great hardship amongst the people and difficulty in obtaining a bare existence. A few who sowed turnips are using them in the scarcity and apparently recognise their value. Rains have been quite sufficient for all purposes and the veld is excellent; all stock healthy and in good condition. There are lots of locusts along the coast, and whole families of Natives drive them from their lands, but as the locusts are fliers very few are destroyed. A severe hailstorm passed through part of the district a day or two ago, the stones being nearly 1 oz. in weight. L. FARRANT, R.M.

Nqamakwe, *Jan. 3rd.*—Heavy rains fell during last month, and the Natives have resumed ploughing. Unfortunately, owing to the poor condition of the stock, many cattle and sheep succumbed to the rain and cold. Locusts have entirely disappeared from this district. C. WARNER, R.M.

Port St. John's, *Jan. 7th.*—November: Light rains having fallen during November the Natives were enabled in some parts to do a little ploughing. Migratory swarms of locusts are seen here and there, but no damage of any consequence has so far been done by them. Stock of all kinds are healthy and in good condition. December: Fine rain fell this month, consequently the Natives have been able to sow large quantities of grain. It is a gratifying feature to note the great increase in the area of new lands now being cultivated. Stock of all kinds are healthy and looking well. A swarm of locusts in the voetganger stage made its appearance in Nomandi's Location, but thanks to the energetic measures taken by the people of the location, the swarm was immediately exterminated. I have not heard of any other appearances of the pest in this district during the month. W. TURNER, R.M.

Tabankulu, *Nov. 30th.*— During the month of November we have had a spell of very dry weather. Little or no ploughing has been done. Owing to the want of grass, stock of all descriptions have been removed to the mountains, where the pasturage is good. There is little or no disease among cattle. *December 31st*: Heavy rains have fallen during the early part of this month. Natives have ploughed up all available land and sown mealies. There is every prospect of an abundant mealie crop this year if the rains continue. The pasturage is good and all stock are doing well. A. LEARY, R.M.

Tsomo, *Jan. 4th.*—The rainfall registered at this station during the month was 4.55 inches. Beautiful rains fell during the month, and the Natives are all busy ploughing. Two cases of lung-sickness have been reported during the month. Since my last report, the stock in the district have improved slightly in condition. During the rain a great many sheep and cattle died, owing to poverty. W. THOMSON, R.M.

Umtata, *Jan. 4th.*—Crops are promising well, and locusts have practically disappeared. The very fine rains which fell last month, coupled with the warm weather, should force crops, and green mealies should soon relieve the pressure which the Natives are at present feeling for want of food. Stock are rapidly improving in condition. T. NORTON, A.R.M.

Willowvale, *Dec. 31st.*—17.04 inches of rain fell during the month, and consequently the young crops are most promising and the veld in excellent condition. The district is still free of locusts, and with the exception of a few cases of horse-sickness stock are free of disease. M. W. LIEFELDT, R.M.

Xalanga; *Jan. 8th.*—During December fairly good rains fell, though by no means sufficient; to-day the ground seems almost as dry as before. Grass is looking well comparatively, though by no means as luxuriant as it should be this time of year. Natives have been very busy putting in mealies and Kaffir corn, and look forward with seasonable rain during the next few months to getting good crops. Cattle and small stock are looking fairly well. E. HOGGE, R.M.

Rust-resistent Seed Oats.

In connection with the question of Rust in Oats to which attention was drawn in the *Agricultural Journal* of the 6th December last (No. 12, vol. xvii.), it will doubtless be of interest to farmers to learn the result of inquiries made by this Department in Australia and Canada, as well as in the United States of America.

The Secretary for Agriculture, Melbourne, writes that of all the Oats grown in Victoria, Algerian are the best; and that of 13 different varieties which the Vegetable Pathologist tried at the Experimental Station last season, not one was equal to this sort. It is considered that Algerian oats require to be sown early; it is a good stooling variety and comes on well at the latter end of the season. He further states that at the Experimental Station 60 bushels per acre have been obtained, and as high as 100 bushels in the Western District. Although grown on rusty spots, the Pathologist has never observed this oat to be injured by rust. He has put it to a severe test for rust this season by growing it in low-lying spots, but the result has not yet been ascertained. Well selected and clean samples could be obtained about the end of January at from 2s. to 2s. 6d. per bushel.

This good character is confirmed by the Under Secretary for Mines and Agriculture, N.S. Wales, who states that "our experiences of our Experimental Farm managers tend to show that the Algerian oat has been found to resist the attack of rust better than any other varieties grown by them."

In Queensland it would appear that the seed oats are nearly all imported from Tasmania and New Zealand, Algerian and other oats being chiefly grown for hay and not for grain, and it is reported that "oats have been found in Queensland badly infested with rust when wheat alongside was perfectly clean."

The Director of the Government Experimental Farms in Canada —Dr. Saunders—writes that "we have tested a large number of varieties of oats at the Experimental Farms, but we do not find any of them entirely free from rust. We do, however, find that some varieties are more subject to rust than others. Among those least affected with rust, and which are at the same time highly productive, I would mention, are the Banner and Bavarian. I think either the

Banner or Bavarian oats could be obtained from any of the large seed houses of Toronto, such as the Steele, Briggs Seed Co. and Mr. Wm. Rennie. I do not know what the price would be this year, but presume it would not be more than 50 cents per bushel of 34 lbs. for good grain. It is, I fear, however, rather too early in the season to get quotations from the seedsmen, as many farmers have not yet threshed their grain and the seedsmen do not generally take in stock until February or March."

Writing from the Experimental Station, Georgia, U.S. America, Mr. R. J. Redding, the Director, says in regard to what are known as Texas Rust Proof oats:—"This variety has been grown in the South for many years and is valued chiefly for its strong rust-resisting power. It is supposed to have originally come from Mexico. Some 10 years ago this Station purchased a lot of seed called the Appler Rust Proof from a gentleman who had been growing them with great care for 10 or 12 years, having started originally with selected seed of the Texas Rust Proof. These oats this Station has been growing now for 10 years under the name "Appler," that being the name of the original introducer. We have sold these oats annually for several years in quantities to the amount of 600 or 800 bushels to the year, and have scattered them all over the South. The original rust-proof is but little, if any, inferior to the Appler, and may be had from different parties of which I give you the names and addresses of the following as advertised in the *Southern Cultivator*, Atlantea, Ga.: Alexander Seed Co., Augusta, Ga.; B. G. Tomlin, Butler, Ga. The Tomlin oats are advertised under the name of "Genuine Rust Proof, Tomlin Variety," grown by Mr. Tomlin from fall sown seed for 29 years. Messrs. C. A. Dolittle & Son, Augusta, Ga., advertise Appler Rust Proof Oats. I presume from seed furnished by this Station. This Station has sold all its surplus for this season. I have no doubt Texas Rust Proof or the Appler, which is, as I said above, a selection of Texas Rust Proof, will be suitable for the South African climate."

H.M. Consul-General at Algiers, writes that Dr. Tarbut, Principal of the Government Botanical Service in Algiers, informs him that after eight years of experiment on more than sixty varieties of oats, two kinds only have been found to be rust-resistent. The first of these is a kind known as the Giant Oat of the Abruzzis, procured by Dr. Tarbut from Naples, and the second is a local variety of white oat.

It must be clearly understood by growers and others concerned that there is no intention on the part of the Government of interfering with the business of importers by procuring seed oats for farmers; but in order that the Department may be in a position, after practical trial of different varieties, to decide which it is most desirable to recommend for import, small consignments of different sorts are being introduced and will in due course be distributed for experimental sowing under conditions which will be advised at a later date.

About 300 bags of River Plate oats have therefore been purchased from a local firm at Port Elizabeth, and 1,500 bags of Texas oats are

under order at New York as well as 100 lb. of the "Appler" Rust Proof oats, above referred to. Besides these, small lots (300 lb. each) of the "Banner" and "Bavarian" oats have been ordered from Canada; and 100 lb. each of English grown oats called Pedigree White Oat—"Scottish Chieftain," and Pedigree Black Oat—"Champion Black Tartarian" are being procured from J. H. King of Reading, England.—EDITOR.

Scientific Farming.

Scientific farming is good farming, though the farmer may not know that science has anything to do with success.

The farmers of the North Carolina coast were buying large quantities of nitrogenous fertilizers at heavy cost. They had already learned that corn or cotton following cow-peas gave better crops than when following each other, and they purchased nitrogen for their cow-peas just as they did for other crops. Scientific tests were made, and it was conclusively proven that they could secure nitrogen by simply planting cow-peas, and that it was a waste of money to buy it for that crop, or for other crops, when they could fertilize it with pea vines. Now they plant peas for nitrogen and save their money, and thousands do this who know nothing of root tubercles, or nitrogen-gathering bacteria. Thus far they are scientific farmers.

Farmers in Bandera county, Texas, and many other counties throughout the country, are buying seedling peach trees, guaranteed to reproduce the same variety indefinitely, paying $2.50 each for the trees, when they could buy far better trees for 15 to 25 cents each. They did not know the scientific fact that with most cultivated fruit the seeds reproduce with any degree of certainty the species only, not varieties.

For many years, in time of drought, farmers ploughed deeply under the impression that the more soil was exposed to the air the more moisture it would absorb, when the process was precisely the reverse, the air being dry absorbed moisture from the soil. It remained for science to demonstrate that moisture cannot pass through dry earth, and that water ascends through capillary tubes in the soil, and that therefore, if, by shallow and frequent stirring of the top soil, it can be kept dry, and the formation of capillary tubes be prevented, the moisture in the soil may be preserved until consumed in plant growth. As a result of this scientific discovery, all good farmers now know that the best means of preventing injury by drought is to keep the cultivators going not more than two inches deep. They may not understand the theory, but, what serves their purpose just as well, they know the facts. There are still some farmers who fight drought with the turning plough, and pile up the ridges to absorb moisture from a dry atmosphere.

Five years ago we planted some grapes, and having more vines than we had ground for, let a neighbour have some. These vines are planted just across a 20-foot alley, and have been carefully cultivated. For two years his grapes have all rotted ; our vines (same varieties) are loaded with sound and luscious fruit, except two vines neglected, as stated in a recent issue. We sprayed our vines with Bordeaux mixture, the neighbour did not.

Bacterial diseases and destructive insects have so multiplied in recent years that many of our profitable field, orchard and garden crops could not be grown and the fruits secured but for the develop ment of science. The San Jose Scale in five years had almost destroyed the great orange-growing industry of California, when science disclosed the fact that by the introduction of a parasitic disease, the scales could be killed off to such an extent as to render them comparatively harmless.

The discovery of the manner in which Texas fever is conveyed to susceptible cattle, and the process of inoculation for the purpose of rendering imported cattle immune, have saved to the cattle interests of Texas alone hundreds of thousands of dollars.

The various anti-toxines for the prevention and cure of other contagious diseases are annually saving to farmers and stock-raisers millions of dollars.

We have seen thirty acres of wheat reaped in one week by a man with a cradle, while three others bound it in bundles, and four men then threshed it in another week with flails. That was efficient harvesting in those days. We have seen thirty acres of wheat cut in one day by one man with self-binder and team, and have seen it threshed the next day before noon, and it may have been marketed on the evening of the same day. This is an example of the improvements that have taken place in fifty years, or less; not an extreme one, either, for one man with proper appliances may cut, thrash, and with an assistant for a few hours may sack and market thirty acres of wheat all in one day. It is needless to further recount the achievements of science in the field of agriculture. Suffice it to say that through the aid of modern appliances and scientific processes one man can produce food for a hundred, whereas, less than half a century ago to feed a family of eight kept the farmer busy fourteen hours a day for every working day in the year.

It is quite true that a man may study agricultural science half a lifetime and spend the other half in futile attempts to put these principles into practice; yet a man may be both scientific and practical, but no man is a worse farmer because of scientific knowledge. There are men of whom science could not make successful farmers in a thousand years. The success of our German farmers is proverbial. Why are they better farmers than Americans? Prof. Strahan, himself a scientific German farmer, says: "Every German farmer has either studied agricultural science at one of the numerous agricultural schools, or has practised it under one who has."—*Texas Farm and Ranch.*

Potash and its Function in Agriculture.

Professor H. W. Wiley, Chief of the Division of Chemistry in the United States Department of Agriculture, has published an important communication on "Potash and its Function in Agriculture," which is at once suggestive and instructive. The potash naturally present in a soil, in common with its other mineral constituents, is the residue of the decomposition of the minerals which composed the original rocks. In these the potash is chiefly held in the structure of silicates, more or less complex, and wholly insoluble in water. In the *debris* of these rocks, as found in the soil, it is evident that the potash must still be held in the insoluble state, but, nevertheless, so thoroughly decomposed as to be yielded gradually to the demands of the growing plant.

During the progress of decomposition a portion of the potash passes into the soluble state, and is removed by the washing produced by heavy rains. Investigation showed that there is slightly less potash in the surface than in the subsoils, and this indicates that the washing of the surface soil, and the abstraction therefrom of the potash by the growing plants, tend to diminish the total quantity of potash therein, as compared with the lower layers of soil where these extractive forces are less vigorous. On the other hand, the potash in the surface soil is more soluble than that in the subsoil. This condition is brought about by the greater exposure of the surface soil to weathering influences, and by the action of cultivation in reducing partially decayed mineral fragments to a finer state of subdivision, and to the chemical activity of soil ferments and plant life. It is generally assumed that one of the chief factors active in securing the solution of potash in the soil is the acid secretion of the rootlets of plants. A very fertile soil, taken at 1ft. in depth, may contain as much as 2 per cent. of potash, which would amount to about 69,000lb. per acre. The Rothamsted unmanured wheat soil contains 8,687lb. of potash per acre, while the average of five Russian soils, in each case reckoned to the depth of 1ft., contained 61,229lb. of potash. A crop removing 50lb. of potash a year could be grown consecutively for more than 1,000 years on such soils before their content of potash would be entirely exhausted. Further research shows that the stores of potash are either conserved by fertilisation or are gradually restored from the deeper and apparently inexhaustible supplies afforded by the progressive decay of subterranean rocks. The rootlets of plants come into intimate contact with only a very small portion of the soil in which they grow, and it is the semi-soluble potash in these soil particles that serves for plant food. When, however, a small quantity of potash, soluble in water, is added to the soil, nearly the whole of it, under favourable climatic conditions, may be absorbed by a single crop. The soil holds a certain quantity of fertilising materials with such tenacity as to render it practically impossible for plants to entirely absorb the

supply, and leave the land utterly impoverished. Thus nature to a certain extent defends the future against the rapacity of the present, for it is certain that should science discover a method whereby all the fertilising ingredients of the soil could be made available in fifty years, aggressive agriculture would not hesitate to take advantage of the opportunity.

It is evident that the quantity of potash withdrawn from the soil by a given crop varies from year to year with the abundance of the harvest and with climatic conditions. The potash which enters into a crop is not all removed by the produce carted away. A part remains in the underground rootlets, and in the straw, stubble or other *debris* left in the field. The most complete removal of the potash takes place with root crops, such as mangel wurzel, sugar beet and potatoes, especially when both tops and roots are removed. The minimum harvested quantity of potash entering into crops and subject to removal is found in fruit, in maize gathered from the stalk, and in cereal grains. Different plants in a dry state contain very different quantities of potash, and these variations are equally well marked in the different parts of each plant. For an average harvest the quantities of potash removed from the land by some of our common agricultural plants are as follows: Mangel wurzel, 229lb. per acre; sugar beet, 131lb.; potatoes, 87lb.; wheat, 34lb.; oats, 52lb.; barley, 32lb.; peas, 44lb.; beans, 84lb.; clover hay, 74lb.; and lucerne hay, 104lb. per acre.

In cereal crops about four times as much potash is removed in the straw as in the grain, while in peas, beans, and other crops of that kind the proportion is about two to one in favour of the straw. This is an important fact to be considered in preserving the straw of these crops for forage and manurial purposes. From the foregoing statements it is easy to determine the drain on the potash stores of the soil which is made by the leading field crops of this country. In many localities the quantity of the crop produced may be very much greater or less than the average, and in these cases the loss of potash must be correspondingly increased or diminished. In considering the kinds of soil requiring potash manures, it may be stated that soils reclaimed from marshy and vegetable or peaty soils generally are deficient in potash. The light sandy soils used for growing early vegetables, potatoes, turnips, barley, &c., are also uniformly deficient in potash. As the clay content in soils increases it will be found, in general, that there is a corresponding increase in potash, since both clay and potash are derived from the decay of silicates. But even in such soils, when a chemical analysis may reveal an apparently satisfactory quantity, the addition of small quantities of soluble potash salt supplies the conditions for a marked increase in fertility. The fertility of land, in given climatic conditions, is measured not by its most abundant but by its weakest fertilising principle. The essential condition of the good results of potash when added as a manure is that it completes a well-balanced ration. Only when the other necessary ingredients of the plant ration are

present in proper proportions can it be expected to secure from added potash the maximum benefits. Further, it has been abundantly demonstrated that the beneficial effects of potash in the soil are greatly affected by lime. Lime in this respect plays a double part, serving both as an indispensable food of the plant and as a most necessary adjunct in those decompositions induced by chemical action, and without which plant nutrients could not assume their natural functions. It seems quite certain that in the decomposition of manurial salts under the combined influences of bacterial and chemical activity, the separated acids would exert a fatal influence on vegetation were they not at once neutralised by an appropriate base. In other words, the plant juices, being acid, absorb the decomposed base with greater activity than the free acids, and, as a result, there is an excess of acidity of a mineral nature produced in immediate contact with the most tender parts of the roots. The great function of the lime in the soil, aside from its mechanical effects, is, therefore, to neutralise this free acid and protect the plant from its injurious effects. It is certain that much of the acid thus produced is unnecessary for plant growth, and is permanently withheld from entering the vegetable organism. The nitric and phosphoric acids are retained only long enough to permit of their proper absorption, while the carbonic acid which is produced escapes to enrich with this constituent the soil gases, or to finally find its way into the atmosphere. Further, it must not be forgotten that the addition of potash salts to the soil causes, to a certain extent, a loss of time. It is assumed that for every pound of crude potash salt added to the soil there will be a loss of a corresponding weight of lime. A judicious addition of lime, therefore, to a lime-poor soil is a necessity when the best results of adding potash are to be secured.

The addition of potash salts to a heavy soil, that is, one having an excess of clay, tends often to make it more impervious and impermeable. In such cases the use of potash, even when the soil demands it, may be more injurious than beneficial. These unfavourable effects may be completely prevented by the generous application of lime. Poor drainage is sufficient to neutralise all the good effects which may be produced in a field by the application of needed potash. In this case, as with other fertilising materials, the proper culture and aeration of the soil are imperative. To apply fertilisers to a piece of land saturated with water and deprived of means for its overflow is only a mark of poor judgment and a waste of good money. What kind of potash manure is best in any given case depends on two factors, namely, economy and the requirements of the crop. Kainit salt, which contains about 12 per cent. of potash, is generally the most economical for the farmer to buy; but, when freight is a consideration, then sulphate of potash, which contains 50 per cent. of potash, may with advantage be purchased, as 1 ton of the sulphate will contain as much potash as 4 tons of kainit. In intensive pot or

garden culture, where highly concentrated plant foods are desired and where the cost of the fertilisers is unimportant, potash may be applied in the form of phosphate or nitrate.

In some soils potash salts, in common with other saline bodies, produce injurious effects by reason of their hygroscopic nature attracting moisture, and, on drying, producing a cementation of the soil, which renders it impervious to water and impenetrable by the rootlets of plants. Potash fertilisers should, as a rule, be applied in the autumn, or at least from two to four weeks before planting, and should be thoroughly worked into the deeper part of the soil in order to come into contact with the rootlets of the plants. The germination of seeds, especially if they have a low vitality, is retarded by bringing them into direct contact with potash salts. These manures tend to favour the decomposition of mineral particles in the soil, and thus indirectly add to the stores of plant food therein.—*Field.*

Green-Manure Crops.

Professor Hilgard, of the University of California Agricultural Experiment Station, remarks as follows on the above subject:—

The Need for Green-Manure Plants.—The importance of returning to the soil of orchards and vineyards an amount of nitrogen at least equivalent to that removed by the fruit crop, and also the humus gradually burnt out during the dry season, in order to maintain fertility, has caused the Experiment Station at Berkeley to devote much attention to the testing of various leguminous plants—plants of the pea and clover tribes—recommended for this purpose in other parts of the world. While it is comparatively easy to find plants that will answer this purpose when or where summer growth can be allowed, as in the case of field crops, the selection of plants that will grow in winter so as to permit of being turned under before the summer's drought renders such growth too wasteful of moisture, is a matter of no little difficulty. The present bulletin is designed to give the most promising results thus far obtained, in order to promote large-scale experiments by farmers during the present and coming seasons.

Plants other than those of the leguminous order (clovers, peas, beans, lupins, etc.) are not recommended for green-manuring, for the reason that they supply to the soil only the humus, besides what substances they have taken from it during their growth; while yet, a leguminous crop costs no more than any other. It is true that in the case of all tap-rooted plants the surface soil is enriched by what was taken from the subsoil. But as in the arid region the surface soil is largely of less importance than the subsoil, on account of the deep rooting and feeding characteristic of plants in arid climates, the advantage thus secured is greatly reduced; as is also that of

the crop roots being afforded an opportunity of deep-rooting by following the course of the tap-roots of the preceding crops. Moreover, nitrogen being the most expensive of elements supplied in manures, the advantage of securing it from the atmosphere without additional cost is obvious.

The legumes combine all the points required of a green-manure plant—nitrogen-absorption from the air, deep-rooting, and, at the proper stage of growth, that succulence which is conducive to quick decay, thus rendering the crop-ingredients available at the earliest moment. Nevertheless, the ploughing-in of other green crops or weeds, when convenient, should not be neglected.

It should be stated that the absorption of nitrogen from the air is conditioned upon the formation of excrescences or tubercles upon the roots; these being formed by the bacilli possessing that valuable faculty. When the soil is abundantly supplied with available nitrogen-compounds, tubercles may fail to form; and such failure may also result from the absence of the proper bacilli, rendering necessary the "inoculation of the land."

Peculiar Conditions Require Peculiar Plants.—The peculiarities of the climatic and agronomic conditions of arid regions make it largely impracticable to utilize the crops employed in humid regions. Our choice is ordinarily restricted to annual plants, which make a good winter growth and can be ploughed under in spring (usually in March), so as to avoid the waste of moisture from summer growth; they must be adapted to calcareous soils; and must have stems not so woody as to resist fairly rapid decomposition.

It has been suggested that many of our native Californian species would prove better adapted to these conditions than introduced plants; but none of the numerous species so far tested for this purpose has given entirely satisfactory results; they develop too late in the season, and are not always hardy against frosts.

Among the various leguminous crops so far experimented with at Berkeley, Bur Clover (*Medicago denticulata*), Square-pod Pea (*Lotus tetragonolobus*) and Snail Clover (*Medicago turbinata*) have given the most promising results; but none of them yields as heavy a crop as could be desired, and the two last have not been found suited to all our climatic conditions.

For further information on the subject of green-manuring, the reader is referred to the Report of this Station for the year 1894-95 under the title of "Supply of Soil Nitrogen," pp. 32 to 35, and "Crops for Green-Manuring," pp. 118 to 123.

The Station has sent for a sufficient supply of seeds of the several kinds of lupins herein mentioned, for the distribution of small trial packets early in autumn. But as the success of some of the varieties mentioned for green-manure purposes is already definitely ascertained, it is hoped that the facts here given may induce some enterprising seedsmen, or private parties, to make larger importations from France and Germany for large-scale trials, which cannot fail at least to pay expenses, if they do not prove highly remunerative.

STOCK FARMING.

Cape Mohair.

In the *Journal* of the 3rd ultimo I notice an article by Mr. Hollings about Cape Mohair, in which he draws our attention to the fact that the bulk of Cape firsts is not sufficiently fine and lustrous for the manufacture of the finest fabrics, which consequently causes a run on Turkish hair being more suitable. I may say that, as Angora farmers, we have always tried to raise the standard of our mohair by care and selection of the best stock obtainable, and I would also like to mention that the rams that have been imported from time to time in this country, if of the best type, should by now have given us a far better result; but how many of us know full well to our cost that most of them have turned out different to what we expected and their progeny in many cases too indifferent to use.

Unlike our other domestic animals, types of the best bred and purest goats are very hard to procure; there being so many restrictions on the importation of such stock that the average farmer is unable to get them; and he can only look to the Government of the Colony to try and arrange the business for him, and only thus can a satisfactory importation be made. I would suggest that owing to the great difference in the fineness and other valuable qualities of our hair as compared with the Turkish article, our Government appoint a Commission of three persons, a Bradford mohair expert and two leading Angora farmers from South Africa.

The Colonial Government should then approach the Turkish Authorities so as to enable the said Commission to procure goats in certain districts, where the finest and best bred can be obtained.

The Commission would then purchase a certain number of such animals as in their opinion would raise the standard of our mohair; and having a man who fully understands what the trade requires, as well as men who are practical, particular goat breeders, we would be able to procure animals of high quality.

Such animals could be sold by public auction on their arrival, or retained on a stud farm if the Government deemed it better. There is no doubt that greater care is necessary in the selection of rams, if we are ever to procure hair of a higher quality than is at present grown, and the Turkish goat is most likely to do the good if suitable ones are got.

I would also suggest that the Bradford expert be present at one of our most representative shows, say Port Elizabeth, and have fleeces of the Turkish hair taken from kids, grown goats and rams, and that some of the leading Colonial Angora farmers be requested to meet him there with fleeces grown by them, the animals to be naturally grazed and not artificially fed.

The Colonial and Turkish articles could thus be seen together and the defects pointed out to the growers, who would thus better understand what is wanted and what they should strive to breed into their flocks.

The matter is worth the attention of our Secretary for Agriculture, and I trust he will give it his consideration.

Mr. Hollings' remarks about false packing is a matter to be regretted, but I think the merchants in this country could see when buying the stuff that such fraud had been practised, and the offender could be made to suffer by not securing the best price for his hair.

We started a Mohair Growers' Association to protect honest growers from dishonest ones, but I am sorry to say that Association was not given the support it merited and it has since stopped operations.

In every industry fraud is likely to be tried on, and the hair may even be mixed by unprincipled buyers after it leaves the farmers' hands.

Mr. Hollings, I trust, will keep on working in the matter until we can produce bales of hair equal to the best Turkish article. This country has a class of men who know how to farm and attend to their goats in all details, if only the right stamp of goat is imported to raise the character of our fleece.

It may not be done in a year or two, but let us see that we are on the right track to attain the desired result.

In conclusion, I trust the Government will consider my remarks, they are what to my mind appear the best steps to be taken; and as this is largely a pastoral country, we cannot afford to let such important matters lie dormant.

SIDNEY HOBSON.

Fairview, near Aberdeen, Jan. 30th.

Live Stock Journal Almanac for 1901.

(REVIEW.)

A very interesting annual publication recently received is *The Live Stock Journal Almanac for 1901*, which contains fifty special articles and numerous illustrations of typical representatives of the principal breeds of English farm stock, including poultry. There are also carefully compiled tables of information and statistics on all subjects of interest to the farmer and stockowner, and not the least valuable portion of the volume to the colonial stock farmer, who is constantly inquiring for such information, is that part which contains a complete breeders' directory, and the announcements of distinguished breeders accompanied by illustrations of their most famous breeding animals which are object lessons of the different breeds in themselves.

The opening article, with accompanying engraving, refers to the breeding and marvellous trotting performances of that famous Hackney mare Phenomena.

The second article is by Mr. T. Trench, who advocates the use of "hunter sires" for breeding riding and light driving horses. The aim of his paper is to point out that if breeders of light horses would abandon the present indefinite and haphazard plan of crossing the thoroughbred on all shapes and sizes of mares to obtain such stock, and would instead select and mate animals that approached the nearest to the stamp of animal that they are aiming at, a uniform standard would gradually be established, and by careful selection become fixed in type, and make the breeding of such animals more of a certainty than it ever can become by the present method.

Under the title "Army Horses Abroad" Sir Walter Gilbey, Bart., gives an interesting account of the types of military and carriage horses shown at the International Show at Paris, and proves how successfully foreign breeders—under the fostering care of their respective Governments—have obtained the object aimed at by the skilful use of the best types of English horses, thoroughbred Hackneys, etc., on their native stock. Then follows a concise but clear article on the "Demand for Heavy Horses," and how to meet it, by P. A. Muntz, M.P.

The next article, "The Rate of Growth in the Horse," by Professor Cossar Ewart, is one of the most interesting and instructive papers in the volume, and should be carefully studied by every horse breeder.*

The importance of the generous treatment of the brood mare and her foal, especially during the early months of the latter, has been long recognized by intelligent and observant breeders, but the Professor by his accurate observations has placed the subject of the appropriate treatment of the mare and foal on a sound scientific basis and clearly shows how the information thus obtained can be economically and successfully applied by the breeder.

The next article, "Military Stables and Stable Management," by C. Stein, contains many valuable suggestions respecting the feeding and general treatment of military horses with a view to training them for active service in the field under every variety of conditions as regards food and climate. This is followed by a short article by Sir Richard Green Price, Bart., in which he strongly advocates the breeding of ponies for army purposes. There is a slight tendency at the present time to claim a wider field of usefulness for ponies than the majority of them are capable of filling, but Sir Richard makes out a good case for a good pony. The value of local shows is clearly and forcibly presented by Lord Middleton; and W. B. Tegetmeier, in a short but tersely written paper, discusses the question of "The Supposed Influence of a First Sire," and sums up his argument by confidently stating "that there is no foundation whatever for the

* Will be taken over in our next issue.—Ed.

theory of telegony." If this is true, and the whole of the experiments conducted during recent years, by Prof. Cossar Ewart and others, clearly support the negative view, it is marvellous how such an opinion should have been so widely entertained by intelligent breeders of all classes of stock. There are also interesting and instructive articles on the "Management of a Milking Herd" and on "Our Beef Breeds of Cattle" by Messrs R. McConnell and R. Bruce, and there are also interesting descriptive articles by specialists on all the leading breeds of horses, cattle, sheep, pigs, poultry, etc. It will be seen, therefore, that this year's *Live Stock Journal Almanac* contains a mass of information which is of great interest and value to the farmer and stock-owner, and the price is only 1s. The publishers are Messrs. Vinton & Co., Ltd., 9, New Bridge Street, London, E.C.

D. Hutcheon,
Col. Veterinary Surgeon.

Reputed Non-hair Shedding Angoras.

With reference to the subject of this discussion in No. 6 and letter from S.J.H. in No. 10 of vol. xvii. of the *Journal*, the following communication from Mr. Hoerle appeared in a late *American Sheep Breeder*, and it contains not only special reference to non-hair-shedding but other matter of interest in relation to Angora farming:—

"I have just received from Dr. J. R. Standley of Platteville, Iowa, the following inquiry:

"I see that in some of your articles you speak of 'Non-shedding' goats and also of "Thoroughbred' goats. Will you please tell the readers of the *American Sheep Breeder* their meaning."

On account of my claim that really well bred Angoras should not shed their mohair, but keep on growing it like sheep do wool, I have had quite lively attacks from all sides, and I am glad that my own observations on that fact, which I made as early as 1882-3, are supported by the Cape breeders. Of them the most decided in his expression on this point is Mr. R. C. Holmes of Karree Hoek, Cape Colony, who says in a letter to me: "With regard to well bred Angoras shedding their hair, I quite agree with you that they should not do so. In fact, among my goats, it is quite an exceptional thing to see a goat shed, and even the ewes, at kidding time, do not shed. At that period some few may do so, but very few indeed, and a ram should never shed." This does not lack in clearness, and as Mr. Holmes is one of the most prominent goat breeders of the Cape Colony, his words should give a progressive breeder something to ponder over. As a further proof, I refer to two photos in Mr. Schreiner's book, viz., pages 119 and 255. They represent three animals of Mr. C. G. Lee's breeding. These animals were taken

"bearing fleece of 13 months' growth." Yet their photos indicate that the fleeces were in a state of vigorous growth, which would indicate that it would take at least five or six weeks before they would show a bare skin. Had they been yearly shedders this would not have been possible. Besides I, myself, have allowed some of my Angoras of Price Maurice importations to run as long as 14 to 15 months before I clipped them.

As to the term "Thoroughbred Angoras," I have made use of it ever since about 15 or 16 years ago. I came to the conclusion that even in Asia Minor the really pure Angora has become a thing of the past. In this Mr. Schreiner as well as Mr. Binns and other writers, have supported me. Since then I have used the term of "Pureblood" only for the original Angora of olden times. That this is not a new fad with me may be seen from that the fact that on page 80 of his book, Mr. Schreiner quotes me on this subject. I have called the highest class of the existing breed "Thoroughbreds" because they are so thoroughly well bred as to deserve that name. All the other classes I have termed "Crossbreds," according to Mr. Schreiner's example, and have, when it was possible, added the number of such crosses. The term "Fullblood," with which usually a fourth or fifth cross is meant, I have avoided from the very beginning as an utter misnomer. This name was invented by a person either entirely unacquainted with the meaning of the word "full," or else with the intention to find a name which conveys the same general idea of the word "Pureblood," and yet leave a loophole for an excuse for inferior quality. I have never seen a single animal in all my life for which that term was claimed which looked anything like "full of Angora blood."

I cannot let this opportunity pass without saying a few words in favour of more stringent rules for the admission of Angoras to the Thoroughbred Register. I would rather advise to add a "Crossbred Division" to the Register, out of which the demand for low-priced bucks could be supplied. Most of the buck breeders antagonize the idea that "grades" should be admitted to the register, pretending that the Purebloods were still in existence. That these animals are to-day entirely extinct is proved beyond a doubt by Mr. Schreiner as well as by Mr. H. O. Binns, who is an authority in Asia Minor. We positively know, as I have pointed out in my old goat pamphlet of 1886, that crossing has been resorted to for at least 150 years. Mr. Binns tells us that the rise in the price of mohair and the demand for more mohair was the cause for the universal adoption by the Turkish farmers of a general cross breeding for the period between 1836 and 1880, but especially between 1863 and 1876. As evidence that the pureblood Angora is not in this country I will quote Mr. Schreiner's and Mr. Binns' description of the original pure-blood. Mr. Schreiner says that it was perfectly covered in every part; had short silky hair all over the face and down to the hoofs and a silky tuft on the forehead. On the same page Mr. Binns is quoted to say "the Angora was a delicate goat, in fact so delicate and liable to disease, that when there was a large European demand for mohair no

one cared to have it in its original purebred form, but desired a hardier goat clipping a heavier fleece." And on page 55 Mr. Binns is again quoted as describing the pure Angora ram in his prime, as "about of the size of a five-months'-old Cape kid, with small, thin horns, woolled all over the body, the hair almost covering the eyes, exceedingly delicate, and so subject to disease that no one cared to keep him. What is to-day called the pureblood Angora is like the thoroughbred horse, the result of crossing and recrossing, until body, class and points, etc., have reached to what is generally considered that the thoroughbred ought to be,"—and adds that, "this pretty little animal did well to give 2½ pounds of hair."

This all is very plain English, and as Mr. Binns is for 15 years out of the business and Mr. Schreiner for several years, their statements must be admitted as at least impartial, and as near to the truth as could be reached. Now look over your "Pureblood" Angoras and see whether they fit the above descriptions of the original animals. To this all Mr. Schreiner says on page 207, "Taking the importations of Angoras to the Cape as a whole—really first-class animals were scarce, and many, especially in the 1880 importations, were worthless mongrels. Nor was there any uniformity as to style or hair or quantity of oil. In many cases coloured kids, often quite black, were born, even when their parents were both imported. So evident was the Kurd blood even in some of the most expensive and most fancied goats that in one season a selected flock of Guedeh goats is stated to have thrown nearly fifty per cent. of coloured kids, some of them black." Such were the Angoras, which were sold at the Cape for fancy prices! Do not think that we, with our small prices and small orders, were supplied with better goats than the large and regular buyers of the Cape Colony. This was in 1880. In 1897 Mr. Schreiner says that owing to the superior intelligence of the Cape breeders and their adoption of modern and scientific methods of breeding, the quality of the best stud flocks has been raised to so high a standard of excellence that Turkey would probably profit by obtaining new blood from the Cape for use of her very best flocks." And I have no doubt that Mr. Schreiner is quite correct in his assertion.

The Cape Colony has received nearly 4,000 Angoras, the United States only about 350. So much more reason for our breeders not to fall into haphazard and promiscuous breeding, with which I mean also the using of animals which sail under false colours, regardless of their quality, but only because they have been admitted into the register. Take two bucks, one registered, but deficient in fleece and of careless variable breeding; the other a "Grade" of ten or twelve crosses of carefully selected stock and with ancestors which for five or six generations have been bred entirely true to the Angora type; which of the two is the more liable to impress his stock with his qualities?

In regard to coloured kids Mr. R. C. Holmes says: "A well bred ram put to the same class of ewes should never have a coloured kid.

With the exception of three or four coloured kids that I had from some of the imported Turkey goats, I have not had a coloured kid even in my ordinary flock for years."

Why, therefore, not concede to our own careful breeders what we would concede to the promiscuous breeders of Asia Minor? On the other side, the fact that animals which have not recorded for them in the register a certain antiquity of breeding, true to the standard type, were to be found in the lowest class of the crossbred division of the register would not make bucks of that quality worth any less, as long as the scarcity of better stock would still have a demand for that class of bucks. Nor would, after the point was once well understood, the carefully bred animals bring a lower price than they would bring to-day as long as their breeders could demonstrate the fact that their animals were of a superior quality, but with each advance into a higher class their value would be decidedly enhanced. I would advise to have all Angoras which are not full fleeced or at least possess a combination of a fair covering together with non-shedding qualities in the lowest class of the crossbred division, and have them advance, as soon as they are both full fleeced and non-shedders, with each generation into a higher class. The crossbred division should have at least four such classes, from the highest of which, viz., after four generations of true to type breeding, they should be put in the thoroughbred division, which also might have four or five classes of excellence. All animals of variable breeding should be thrown back to the class where they belong.

Slowly but surely, we would thus approach the point where the thoroughbred division of the register would get filled with Angoras of really fine quality and high merit, and the careful breeder would then reap the benefit for his care and intelligence in mating his animals."

The above remarks of Mr. Hoerle are fully justified by custom among breeders of cattle and horses, which are entitled to the name of full blood after six crosses of pure blood but are not admitted to be pure bred. The conditions of the case both demand and justify this equitable arrangement both for the present and the future of this breed of animals. By making a distinct class for the full bloods, that is, those animals which have at least six crosses of pure blood, full security will be given to purchasers as well as opportuity to the breeders to improve the stock until in time all recorded animals will be equivalent in value.—ED. *A. S. B.*

Wool and Woollens.

London.—The past year has been the most unsatisfactory ever experienced. Very few were prepared for the sharp fall in prices which set in after the opening of the first series of sales and continued throughout the year, resulting in a fall of 50 to 60 per cent. for merinos, of 25 to 45 per cent. for fine crossbreds, and 20 to 30 per cent. for coarse descriptions. The average price of greasy merino fell from 1s. 0½d. to 7½d. per lb.; that of Australian scoured from 2s. 5d. to 1s. 3d.; and the value of merino wool per bale from £22 to £12. The chief causes were the inability of Continental houses to finance their heavy purchases made in the colonies, and a change of fashion to coarse grades, and a consequent falling off in the demand for fine wools. These influences thoroughly demoralized the markets, and although an effort was made to improve the position by curtailing the third and cutting out the sixth series of auctions altogether, no good resulted. Withdrawals were large at each sale, and some 133,000 bales are held over for realization in the new year. Since the close of the November auctions, and more especially during the latter part of December, a steady inquiry has been experienced, and a recovery of some 5 per cent. has occurred. The deliveries for the season show a decrease of 457,000 bales compared with last year, the Continent having taken 288,000 bales, and the home trade 193,000 bales less, while America perchased 24,000 bales more. The totals catalogued amount to 816,300 bales, against 1,054,000 last year, and the quantity sold at auction was 728,000 bales, compared with 1,013,000 in 1899. The clip compares favourably with that of the previous season, the effect of the drought not being quite so apparent. Some fine qualities were received from Victoria and from the Darling Downs, while South and West Australians, though occasionally earthy with some burr, were, on the whole, good. New Zealand crossbreds showed light condition generally, and were well grown. Scoured Capes were equal to last year's arrivals, but greasy descriptions from Natal and the Eastern Province came over with rather more earth and sand than usual.

Sheepskins.—(Messrs. Charles Balme & Co.).—The fellmonger's business has been rendered very difficult by the heavy and continuous depreciation in values of, and the indifferent demand for, both fine and coarse wools, which at one period led to the accumulation of large stocks of pulled wool. At the same time, the inquiry for roans on American account also fell off considerably, which, added to the other difficulties the trade had to contend with, brought about a somewhat strained condition of affairs. At the February auctions a sharp fall took place in both fine and coarse-woolled descriptions. From this point a maintenance of the unfavourable factors which were weighing on the market caused a rapid decline, which was continued at each series until the lowest point was reached at the October sales. With an improvement in the position of the

wool market, as well as a revival in the demand for raw pelts, confidence was restored, and at the December auctions fellmongers operated with considerable freedom at an advance of 10 per cent. This leaves merino skins 40 to 45 per cent, coarse crossbreds 35 per cent., and pelts 30 per cent. below the rates current at the close of 1899.

LOW WOOLS.—(Messrs. Windeler & Co.).—The total imports amount to 64,577 bales, of which 10,779 bales were entered for re-export, as compared with 66,722 bales in 1899 (11,373 bales for export). There has been an increase of about 12,000 bales from the Persian Gulf, but this is counteracted by a decrease of some 13,000 bales Cape mohair. The quantity catalogued was 34,193 bales—about the same as in the previous year. The stock on hand is now 21,143 bales. With reduced values of competing wools the demand materially fell off. Except to fill some occasional want, prices have been declining and uncertain during the year. From China, notwithstanding interruption to shipments during the latter months, the total received was about the same as in 1899—say, 10,093 bales. Of Cashmere there is now no stock whatever, but of camels' hair and wool there is a stock of 2,450 bales. Of Van mohair there have been received 1,319 bales, showing an increase of about 1,000 bales, recently come in, and which is the present stock on the market.—*The Times.*

VETERINARY.

Lung-Sickness of Cattle; Contagious Pleuro-Pneumonia, or Pleuro-Pneumonia-Bovum-Contagiosa.

Etiology.—This is a specific infective fever, due to the entrance into the lungs of a minute micro-organism. It affects bovine animals only, and is characterised by an exudation of an albuminous limpid serum into the lymphatics and meshes of the interlobular tissue and air cells of the lungs.

Messrs. Nocard and Roux, after much labour and difficulty, have discovered the micro-organism of pleuro-pneumonia and have also succeeded in cultivating it, first by enclosing the serum containing it along with a bouillon in collodion capsules, which were then inserted into the peritoneal cavity of a cow or rabbit. Subsequently they succeeded in cultivating it in test tubes in an artificial medium composed of peptone, to which a small proportion of the serum of the blood of a cow or rabbit is added, and with these cultivations

they inoculated five Breton cows, and succeeded in causing the development of an absolutely characteristic pleuro-pneumonia swelling, which conferred an immunity from further infection on these animals, thus confirming the fact that they were dealing with the causal agent of pleuro-pneumonia. Since then a large number of animals have been inoculated with this cultivated lymph, and the results do not differ appreciably from those obtained with the natural lymph. Messrs. Nocard and Roux describe it as a microbe of extreme tenuity which appears like small refractile moving particles, too minute for their exact form to be discerned with the highest power of the microscope after colouring.

The Period of Incubation.—That is, the period which intervenes between the first contact of healthy susceptible cattle with those affected with pleuro-pneumonia and the date on which the first symptoms of the disease appear in the former. This period is generally stated to be from three to six weeks, with a maximum interval of about four months and a minimum of ten days. But the disease may continue to spread in a herd for from six to twelve months, although all animals are exposed to infection from the beginning. In our experiments the sick and healthy animals were not merely kept in close contact during the night in a moderately small kraal, but also had their muzzles brought into immediate contact, so that the healthy animals were compelled to breathe the breath of the affected animals for a short time daily, this being continued until the first animals showed symptoms of being affected. The following were the results obtained: two animals showed a rise of temperature and visible symptoms of the disease on the 42nd day after contact, one on the 51st, one on the 52nd, and two on the 59th, one remaining unaffected.

Three of these animals died, one was killed to obtain lymph, and two recovered. No medicine was administered.

The Course of the Disease.—One of the above animals died on the 17th day after becoming affected, the second on the 31st, and the third on the 33rd. The fourth was killed on the 6th day and both lungs were found affected, the right more than the left, each having a distinct centre of infection. Recovery commenced in the one case on the tenth day, and in the other on the 28th. Some authorities state that the temperature begins to rise for a week or more before the visible symptoms appear, but in these cases the thermometer did not give any indication of fever until one or two days before the animal could be observed to be amiss, although the temperatures were taken once daily, in the morning, from the date of contact. These morning temperatures of the affected animals ranged from 102° to 104°, rarely the latter. The evening and midday temperatures, when taken, were one to two degrees higher, depending on the temperature of the atmosphere. The pulse is of no value in the diagnosis of pleuro-pneumonia, or of any other disease for that matter, in the case of semi-wild cattle, which are always excited when caught for examination.

If we compare the long and indefinite interval which usually elapses between the date of exposure of healthy cattle to infection and the first indications of the presence of pleuro-pneumonia, when contracted spontaneously, with the comparatively uniform short period of incubation which follows when the disease is communicated by artificial inoculation, we are justified in assuming that some preparatory change in the epithelium of the smaller bronchi and air vesicles of the lungs is necessary to enable the micro-organisms of pleuro-pneumonia to enter the interlobular tissue of the lungs, and that it is the length of the preparatory period which mainly accounts for the difference.

This view is further supported by the fact that the visible symptoms of the disease follow close upon the first rise of temperature, and that when once the disease starts in the lung its progress is usually very rapid. This rapid extension of the specific exudation frequently follows inoculation, even when performed in the tail, for if once the swelling begins to spread at the seat of inoculation, it extends up the tail with alarming rapidity.

Symptoms.—The general symptoms are: the animal looks dull, and the hair is erect—"staring coat"—there is at first partial and later complete loss of appetite, and rumination ceases. In cows the secretion of milk is much diminished and very soon stops.

There is an occasional dry husky cough, which can be excited, and greatly increased, by driving the animal hurriedly for a short distance. This is an excellent aid in the diagnosis of the disease in loose semi-wild cattle.

This cough gradually increases both in frequency and intensity, and becomes more and more painful and distressing. The breathing also becomes quickened as the disease advances in the lungs; the animal stands with its head depressed and its muzzle extended; its forelegs are kept wide apart, and the elbows turned out; the nostrils are dilated, and there is a distinct upper and outward movement of their edges with a corresponding heaving of the flanks, and a peculiar and characteristic grunt accompanies each expiration. When the patient lies down it rests on its sternum, to avoid compression of the chest.

The bowels are generally constipated during the early stages of the disease, but diarrhœa frequently occurs at a later stage. Tympanitis is apt to occur if the patient is allowed free access to water. In cases in which the front lobes of the lung or lungs become consolidated, and press against the thoracic portion of the trachea, I have seen the animals standing with their heads elevated and their muzzles protruding in a straight line from the neck, a quantity of frothy saliva surrounding their lips, their mouths open, their nostrils dilated, and the poor animals literally gasping for breath, moving about the picture of agonized distress.

Auscultative.—On applying the ear to the sides of the chest, an absence of the respiratory murmur will be detected over particular parts of the lung or lungs, and bronchial respiration will be heard in

its place, along with sounds of friction and wheezing. Over the healthy lung the vesicular respirations are much increased.

Percussion.—On tapping the sides of the chest with the knuckles the animal evinces great pain, and instead of the resonant sound of health, the chest gives out a dull dead sound, corresponding to the extent of the consolidation in the lungs. If one lung only is involved, that side of the chest will be observed to bulge out more prominently than the other. The patient becomes greatly emaciated, dropsical swellings appear on the lower parts of the body, such as under the throat, in the dewlap and the lower parts of the chest and abdomen. The action of the heart becomes weak and palpitating and the animal finally dies of suffocation.

But a correct diagnosis of single isolated cases of contagious bovine pleuro-pneumonia cannot be made with certainty without a post-mortem examination, unless the disease has already appeared in the herd, or in the immediate neighbourhood, or several cases have appeared simultaneously to justify the opinion of its presence, as the acute symptoms of the advanced stages of non-infectious inflammation of the lungs, and of traumatic pneumonia—due to a foreign body having penetrated into the pleural cavity or lung tissue—simulate very closely those of contagious pleuro-pneumonia. Even advanced tuberculosis of the lungs may be mistaken for pleuro-pneumonia.

Post-Mortem Appearances.—On opening the chest we generally find on the affected side a quantity of a yellowish turbid fluid, with a large amount of fibrinous coagula floating in it, and adhering to the membranes. The fluid when exposed to the atmosphere soon coagulates into a jelly-like mess. The pleura is thickened, and its surface is covered with a layer of lymph, giving it a rough appearance, and where the parietal and visceral pleura are not kept apart by the fluid exudation they become united by the layers of fibrinous lymph, which in old cases becomes replaced by fibrous tissue, causing firm adhesions of the lung to the wall of the chest. As a rule one lung only is affected, but portions of both may be involved. The affected lung is larger, and greatly increased in weight, and the diseased portions stand out prominently above the adjoining healthy lung tissue. On making a section through the consolidated portion, the cut surface presents a marbled appearance. The marbling is due to the altered and enlarged condition of the interlobular septa, or membranes which separate and surround the lobules. "These septa are composed of a meshwork of delicate connective tissue filaments, saturated with a straw-coloured liquid. This liquid, or lymph of inoculators, is contained in the greatly distended lymphatic spaces and vessels of the septa, and also in the lymphatics surrounding the blood-vessels. When this lymph escapes from the lymphatics, it usually soon forms a soft coagulum. At the margin of the consolidated area the thickening of the interlobular tissue shades off gradually, but is usually traceable into the non-hepatised lung tissue. The lymph is not present in the liquid form in all the thickened septa, in some it is in the form of

coagulated fibrin, while in older affected portions it may be still firmer, having a fibrinous appearance. The section of the consolidated lung appears as small islands surrounded by the pale septa; the shades of colour vary from buff or yellow, light red or salmon coloured, deeper red or flesh coloured, and deep dark red like extravasted blood. An essential feature in the marbling of contagious pleuro-pneumonia is the variety of colour presented by the ground work or pulmonary pareuchyma. We know of no other disease in which this form of marbling is produced. The density of the parenchyma or lobular tissue, like that of the interlobular septa, is variable, and there is generally a gradual transition from the heptised to the normal lung at the border of the solidified portion.

"The outer air cells of the lobular tissue become filled with lymph, and the central cells become compressed by the pressure of the same lymph. In the dark coloured areas the air cells, as well as the septa, are crammed with blood, and in old cases the walls of the air vesicles are thickened by the formation of connective tissue. The fibrinous exudate in the air cells may be of recent formation, or it may already have undergone hyaline or fatty degeneration. A most notable feature of the lesion in the lobules is that it is not at any time associated with marked distension of the pulmonary capillaries, such as is constant in the early stage of other forms of pneumonia" (McFadyean). As a general rule sporadic pleuro-pneumonia appears suddenly and runs its course rapidly. Contagious pleuro-pneumonia, on the other hand, develops more slowly and runs its course less rapidly. The principal post-mortem distinction between them is:—In sporadic pleuro-pneumonia the consolidation in the lung appears to be nearly all of one age, whereas in contagious pleuro-pneumonia there is not alone a greater increase in the breadth of the interlobular tissue, but the consolidation of the lung tissue appears to be of various ages and consequently presents different shades of colour and general appearance.

(To be continued.)

HORTICULTURE.

Tree Fumigation in California.

Tree fumigation for the destruction of scale insects originated in California and has met with its greatest development in that country. The practice is almost confined to the southern part of the State and to the citrus trees; deciduous trees are still generally treated for scale insects by the less expensive remedy of spraying. Partly with the object of learning wherein Californian methods of

fumigation were superior to those of this Colony, the writer recently visited the greatest orange-growing counties, Los Angeles, Riverside, San Bernardino and Orange, and enquired closely into the details of fumigation as there conducted. As a whole the present Californian methods were found to be very similar to those we are following, but as might be expected many little modifications and differences were observed. My information was derived mainly from Messrs. R. P. Cundiff, E. H. Rust and R. T. Curtis, respectively horticultural commissioners in Riverside, Los Angeles and San Bernardino, and from Mr. A. E. Bennett, a contractor fumigator resident in Orange. To all of these gentlemen I became much indebted for many courtesies. At Riverside part of one night was spent in viewing the operations of the Horticultural Commission outfit on seedling trees fully twenty-five feet in height, and at Tustin, in Orange, I saw one of Mr. Bennett's crews at work on fifteen-foot trees. What was learned during the visit that can be of profit or interest to our citrus fruit growers can best be told under pertinent sub-headings.

Californian Conditions affecting Fumigation.—The conditions and circumstances of the citrus industry are very different in Southern California to what they are in the Colony, and before entering upon the details of the fumigation remedy it is advisable to review some of the main features as they account for necessary divergences of our fumigation methods from the Californian.

Southern California has about 3,300,000 orange trees and 1,300,000 lemon; of these about 2,000,000 orange and 500,000 lemon are in bearing. About one-half of the oranges are in Riverside and one-half of the lemons in San Diego. Thirty years ago there were under 40,000 orange and 7,500 lemon trees in the whole State. The greatest increase has been within the last ten years. The vast bulk of the plantings has been in almost solid blocks, one orchard succeeding another for miles in almost unbroken succession in the chief sections.

Scale insects of many species became injuriously abundant about the time the industry began to spread, but the gravity of this pest problem was early recognized and legislation enacted twenty years ago with the view of excluding other pests and of controlling those already introduced. The legislation in so far as it applies to nurseries and orchards was purely what we call "permissive," and although many amendments to the original measures have been secured, the voluntary principle has always been retained. The unit is the county, and a county may be compared to a district in the Colony. If the fruit growers want the legislation they appeal to their county supervisors and a board of "horticultural commissioners" is appointed whose business it is to make the legislation effective. The expense is borne by the county, and the legislation is of value in proportion to the care exercised in the selection of the commissioners and to the monetary and moral support given these men in the conduct of their duties. All the counties in Southern California have the legislation in force, and the commissioners in each

one have, independently, striven for years to prevent the dissemination of scale pests with nursery stock and to prevent the introduction of new pests into their county. The result is that extensive tracts of citrus orchards are entirely free of scale and will probably remain so.

Scale Insects Fumigated Against.—The Black Scale is the pest to suppress which fumigation is now generally conducted. This is a scale quite unknown to our Colonial fruit growers, for while it occurs in many parts of the Colony it is so well kept in suppression by natural enemies that its presence is not recognized. In California, however, it is now considered the worst of the scale pests. It does not kill the growth of citrus trees as does the Red Scale nor does it infest the fruit to any extent; but it is responsible for a copious growth of smut-like fungus, and this dirty, black coating must be removed from the fruit in order to get profitable returns. Fumigation by destroying the scale acts as a preventive. This scale is widely distributed. The Red Scale, which our growers know only too well, ranks next to the Black Scale as a pest; and it would rank first were it not for the fumigation remedy and the fact that it has been kept largely to the older orchards by the rigid inspection of nursery stock. The Black Scale is more readily spread by the wind, birds and insects and is more difficult to destroy; it yields most readily to fumigation when young, and the hatching of the eggs marks the beginning of the fumigation season.

Fumigation was first practised for the destruction of the Australian Bug, which there is generally called White Scale, but before the remedy was perfected almost perfect relief was found from this pest in the Vedalia lady-bird. The Mealy Bug and the Brown Scale, two insects which did considerable damage in the oldest orange orchards, were suppressed by natural enemies before the advent of fumigation. The Yellow Scale, which is so like the Red that the two are confused, is also now mastered by parasites. The Purple Scale is a comparatively recent introduction into California and is still restricted in its occurrence. Unfortunately it is not easy to destroy, and persistent spraying is said to be in greater favour than fumigation to hold it in check.

Systems of Fumigation.—Nearly all of the fumigation work is conducted either by "contractors" or by the county commissioners. In Riverside, where as already stated about one-half of the orange trees of the State are planted, all of the fumigation is done under the supervision of the commissioners. An elaborate system of orchard inspection is in vogue, and when any scale is located the infested trees are mapped and soon afterwards carefully treated. This county never had very much scale owing to there having been little when the legislation noted above was secured, and more owing to the thorough manner in which this legislation has since been applied. The pests have been kept to the older plantings, and are now so effectually suppressed that only about a thousand trees in the fifteen thousand or more acres of citrus orchard require treatment in the

course of a year. The commissioners of the neighbouring county of San Bernardino likewise have all the fumigation work done with county-owned outfits and by their own employees; there is still a vast amount of work to be done in this county before the scales are under control.

The commissioners in Los Angeles control no outfits, and practically all of the fumigation here and in Orange is done under the contractor system. These are the older orange growing counties and where most of the pests started; consequently they have a greater heritage of the insects from the early days than other parts of California where citrus fruits are grown. Los Angeles, too, suffers through immense numbers of trees having been set out in "boom" time by non-residents who have since neglected their properties. Nearly eleven hundred fumigation covers are being worked by contractors in the two counties this season; even this great number is inadequate, and one consequence is that compulsory fumigation cannot be generally enforced. Speaking broadly, a fruit grower in these sections decides for himself whether or not his trees shall be treated. The commissioners, however, are now trying to stamp out the Purple Scale and hope in time to systematically enforce general fumigation. For the present the commissioners believe it better to leave the work entirely to contractors. There is now ample scope for these men and they do their work economically and satisfactorily.

County fumigation is naturally conducted more with regard to absolute efficacy than economy in expenditure. One of its chief advantages over the other system is that the work may be taken up in regular sequence of orchards, none infested being left behind to breed the scales. This advantage is lost in Los Angeles since the horticultural commissioners are still unable to compel the fumigation of every infested place, and where moreover the scales have become so abundant on ornamental and shade trees that general fumigation would in large part fail of its purpose. Of the two systems, the contractor one would be undoubtedly the better in this Colony. The Los Angeles County Commission used to engage in fumigation and six years ago had the largest and best outfit in the State, but it has now given up the business in favour of the contractors. A contractor is generally the proprietor of a number of separate outfits of thirty or more covers. He engages the work, and usually reserves for himself the duty of prescribing the doses for the various trees to be treated. Bennett's plan is to prepare a plan of the orchard on which each tree is represented by figures indicating the measure of cyanide to be given it. This plan is given to the foreman put in charge of the work and is closely followed.

Explanation of Fumigation Remedy.—For the information of those not well acquainted with the fumigation remedy it is necessary to here give a brief explanation of it. The trees to be treated are covered with approximately air-tight cloth in the absence of sunlight, and hydrocyanic acid gas then generated beneath by the action of sulphuric acid on potassium cyanide in an acid-proof vessel. The

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trees are kept covered for about forty minutes, by which time the gas has performed its deadly work and has largely escaped. Dome-shaped cloth covers with mouths kept expanded by means of gas-pipe circles are commonly used for small trees, and octagon-shaped sheets placed in position by means of poles for large trees. As many trees are treated at a time as can be conveniently covered and uncovered during the forty minutes that one of them is left exposed to the gas; for instance, if one tree can be cared for in two minutes it is the aim of the practical fumigator to have twenty covers at work to keep the time fully occupied.

Cloth for the Covers.—The Californians use much lighter material for their covers than we in the Colony. We use duck that weighs from thirteen to fifteen ounces to the yard; the Californians use little that weighs as much as ten ounces, and most of their covers are now made of lighter drill. Most of the covers are made by one firm in Los Angeles, and the head of this concern told me he now used what is known as No. 250 drill almost exclusively; this is a 6½ ounce cloth.

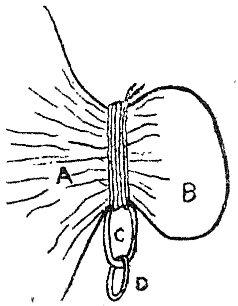
Nearly all of the covers are treated in some manner to make them more air-tight. Oiling is little practised now as oiled covers are easily torn. Two common preparations are used. One of these is the diluted extract of a species of prickly pear into which is mixed a little sizing and ochre; the other a tanning solution bought from tanneries. The prickly pear solution was the earlier to come into common use and is still preferred in Riverside and San Bernardino. The tanning preparation is, however, supplanting the prickly pear one among the contractor fumigators of Los Angeles; it is said to make the cloth last longer and to be equally efficient in closing up the fibre. As far as I could see neither preparation did much toward closing the fibre; but the claims that tanned cloth is more lasting than untreated cloth may be well based. One effect of both treatments is to thoroughly shrink the cloth, and thus whatever other action there may be the cloth is tighter than before.

The tanning solution is received in barrels from the tannery. For use it is diluted with twenty parts of water and poured, boiling hot, into a large vat; after the bottom is well covered a few covers are thrown in, then more liquid followed by more covers, and so on until the vat is full. The covers are left to soak for twenty-four hours and are then suspended to drain; finally they are spread out and after drying are ready for use. I saw one vat constructed for this purpose. It was made of two inch planks and was four feet wide by four deep and nine long. The expense for tanning a thirty-six foot sheet in this was estimated at about eight shillings.

The tanning of covers has not been attempted in Cape Colony. Our first outfits were of cloth treated with oil, and as in California such covers proved not lasting. Treating the cloth with prickly pear solution, using our *Opuntia tuna* as the source of the extract, was tried, but was not brought into practice as it was seen that the cloth was no tighter than when well shrunk with water and as the ochre

quickly rubbed out. At first we used eight and ten ounce ducks. Now, as stated above, we use duck half as heavy again; but these heavy ducks get no other treatment than shrinking with water.

The Californian experience teaches us one thing, and that is that successful work may be done under the lighter cloths. However, in my opinion, it is desirable that we continue the use of the heavy cloth for general fumigation, since aside from the question of retaining the gas the question of strength must be considered. Our covers must be strong enough to stand considerable dragging on the ground and use on trees with hard tops of dead wood. The Californian covers get little of such abuse. The trees fumigated are generally in solid blocks, and the covers are often swung from tree to tree with scarcely touching the ground; and moreover, as the principal scale concerned does not usually kill the wood there are few hard tips to catch and tear the cloth. Under conditions approaching these our fumigators might find it advantageous to use lighter cloth; also for the making of very large covers which will get little use. For use on trees under twelve feet in height, it seems to me inadvisable to trust to a cover made of material lighter than twelve ounce duck. The surface through which the gas escapes increases in proportion to the space enclosed as the dimensions of the tree covered decrease; hence the smaller the tree the more it is necessary to have the cloth of a very close texture, and the heavier the duck the closer is its texture when shrunk. There is not much fumigation of trees under twelve feet in California, or the people there might find it desirable to have their covers for small trees made of heavier cloth than they are using.

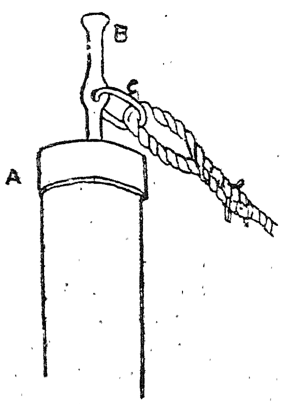


CATCH PLACE ON SHEET. —A, the sheet; B, the gather enclosing ball of cloth; C, ring to receive end of changing pole; D, the "jingler."

Sheet Covers.—The contractor fumigators have practically discarded the dome-shape or tent covers and use in their stead sheet covers like those used for large trees. These sheets are made in sizes varying from seventeen feet across to eighty-four feet across and suitable for trees of any height up to thirty feet. They are commonly made in the form of an octagon, but some I saw were cut in the form of a circle to save weight in handling. Most of them are made of one weight of cloth throughout; but some have heavier centres than borders. An eighty-foot cover used by the Riverside Horticultural Commission and considered by its operators as "just right" has ten ounce duck for the full length strips in the centre, eight ounce duck for the "flap" on each side of the centre, and six ounce duck for a "skirt" all around. The skirt is only the width of the goods, about thirty inches; this part of the sheet rests largely on the ground and gets no strain, and hence can safely be of lighter material than the

body. The strain comes principally on the middle width, hence the heavier cloth used there. This particular sheet has special provision for equalizing the strain in lifting. A rope fully an inch in diameter is sewed in a circle about fifteen feet back from the edge of the sheet, and every ten feet along this rope an iron ring is attached to receive the hook of the pulley block. On the reverse of the sheet pieces of rope four or five feet in length are sewed through to the main rope where the rings are attached. Thus the strain when the cloth is lifted is distributed over a considerable area. The sheet is always used right side up, but the number of rings renders it easy to raise the sheet from whatever position it may rest on the ground. This immense sheet, like all others that were examined, was sewed by machine with heavy cotton thread. No. 20 three-cord Atlantic cotton on 7,200 yard reels from J. R. Leison & Co., Boston, is the thread used by the tent manufacturing firm alluded to above.

The practice of using two or more sheets to cover a tree for which one of the sheets alone is too small has died out amongst all of the fumigators with whom I came in contact. They say they have found it easier and better, and cheaper in the end, to have a sheet large enough to singly cover any tree they have to treat.



TOP OF CHANGING POLE.—A, iron band; B, the catch bolt; C, ring through bolt for attachment of guy rope.

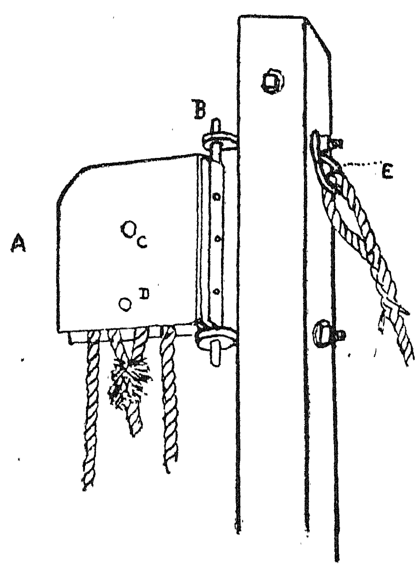
Changing Poles and Jinglers.—The use of what are known as "changing poles" for changing the covers from tree to tree in place of derrick poles is what has made it possible for sheet covers to supplant tent covers in the treatment of small trees. These poles are used by the Los Angeles fumigators for changing all covers under forty-five feet across, and our Colonial fumigators will do well to adopt them. They are light and strong round poles about two-and-a-half inches in diameter and fifteen feet long. The lower end is brought to a point and shod with iron. In the upper is set a three-eighths inch bolt, protruding about four inches from the top and held securely in place by an iron band or ferrule. The bolt is expanded slightly at the tip to prevent slipping, and is pierced near its middle for the reception of an iron ring to which a twenty-five foot guy rope is attached.

The catch places on the sheets are iron rings tied to gathers within which are enclosed balls of soft material such as scraps of cloth. These catch places are not changed unless the cloth thereabouts shows signs of weakening, and as but two are provided the sheet must be in position before being raised. To the ring at the catch place is attached a link of chain called a "jingler," the sole use of which is to indicate to the operator when he gives the sheet a shake

just where the ring is located. This device, simple as it is, enables the men to change the sheets in the dark without lights.

Two men manage a cover and each carries one of the changing poles. They insert the bolts in the catch place rings, drop the poles parallel to one another with their shod feet on opposite sides of the tree to be covered, and then stepping back they raise their respective poles and with them the sheet by means of the guy ropes. The shod points keep the lower ends of the poles in place on the ground while the upper ends carry the sheet over the tree. The movement of the cloth is just the same as when derrick poles are used, and as soon as the front edge of the cover has been brought sufficiently far forward over the tree the poles are withdrawn and the cloth thus allowed to fall in position. It is customary to uncover one tree and cover the next at one operation, and thus the one cover is used successively for tree after tree down the one orchard row.

Derrick Poles.—Derrick poles are used for changing large sheet covers by all of the Californian fumigators. Some differences in construction were noticed, but those we use in the Colony are fashioned like the best. The only improvement over ours anywhere noticed was in having the braces extended a few inches—four to six—below the feet; Bennett's poles were made this way, and the advantage claimed was that the poles have better purchase against the ground. The heaviest uprights seen tapered from 2 in. by 6 in. at the bottom to 2 in. by 2 in. at the top; the pair was cut from 2 in. by 8 in. stuff. Several pairs 32 to 33 feet long for use on thirty foot trees were seen, and all of these had nine foot braces instead of six foot ones.



Top of Derrick Pole.—A, pulley box of sheet iron; B, steel strip to which box is riveted and which is pivoted in heads of bolts; C, pulley wheel axis; D, bolt for end of tackle; E, bent ring held by nut for attachment of guy rope.

The fixed pulley block at the top of the pole was much the same as we use in some of the outfits, but the Los Angeles contractor fumigators have superseded this ordinary block with one devised locally expressly for the purpose. The pulley box is nearly square and is made of sheet iron riveted lengthwise at the back to a strip of steel. This steel strip is flat where it receives the box but has projecting ends which are rounded and made to pivot in the pierced heads of bolts secured through the

wood. Thus the pulley has a lateral motion at the top of the pole, but is otherwise immovable and therefore cannot slip loose or get the ropes twisted. The details of the block and of its manner of attachment may be gathered from the accompanying sketch.

The swinging pul'eys used are four or five inch wood blocks with roller bearings. The ropes are far heavier than ours. The tackles are all of three-fourths of an inch in diameter and the guys generally the next size larger. With steady work even these heavy ropes do not last for more than half a season. Except when attached to the sheet the swinging block is hitched to a hook for its reception on the upright near the top of the braces; this ensures the tackle being within reach when the poles are raised.

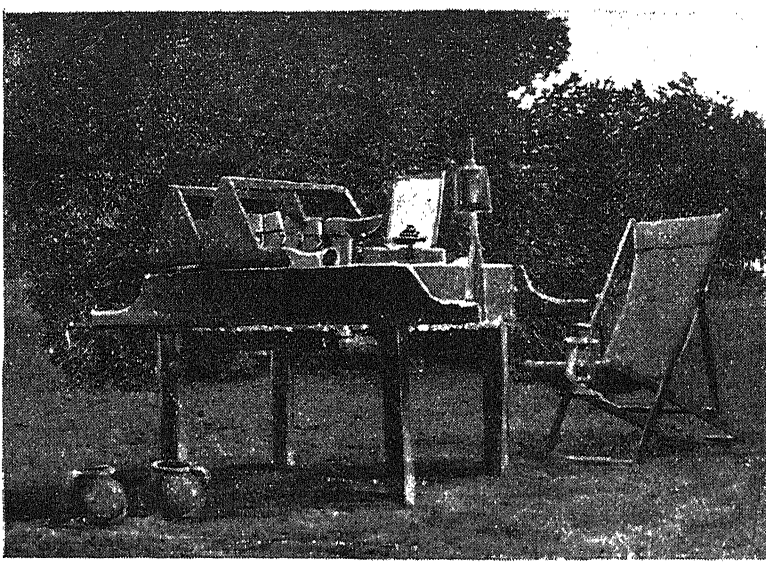
Tent-form Covers.—Dome-shaped covers under the name "bell tents" are used for trees under fourteen feet in height by the San Bernardino county fumigators. These covers are made of eight ounce duck but otherwise are little different from the covers of similar shape used in the Colony. The iron hoops to keep them expanded are of somewhat lighter gaspipe than we use. The operators get very expert in swinging these covers from tree to tree in straight away work, but when changing poles are introduced into the district I think that the bell tent will go as it has in Los Angeles, at least in so far as trees eight to fourteen feet in height are concerned. In our country as well I think that practical fumigators will take to the sheet covers more and more.

Generating Vessels.—The contractor fumigators make common use of "bean pots" for generating vessels. These pots are urn-shaped vessels of cheap earthenware, glazed inside, and they are ordinarily used in the kitchen for the cooking of the celebrated "Boston baked beans." The diameter of the middle and bottom is about twice that of the top, and a handle extends from the middle to the top. One fumigator is using bean pots made especially for fumigation work by a local potter. The San Bernardino outfits use a certain bedroom necessity and claim it superior to any other ready-made vessel, and, disregarding appearances, it certainly is better adapted. The Riverside outfit employs large wooden buckets when treating large trees.

Medicine Table and Trays.—The medicine table is an important feature of some of the outfits. It is ordinarily a shallow box about two feet wide by four long, supported on stout legs. The sides are extended at the ends to form handles in order that the whole may be readily moved along through the orchard as the fumigation progresses. It is here that the doses are made ready for the trees by the "medicine man," which personage is also usually the foreman. The exact procedure naturally differs with different outfits, and with different circumstances, but as a rule the ingredients for the gas are all measured at the table. In this case the medicine man is provided with trays, generally two, for carrying the doses to the trees. The cyanide is first weighed out and put in small cups at once placed on the trays in the order in which the doses are to be used. Then the acid and water mixture is prepared and the scheduled amount poured

in a heavy china mug under the cyanide cup for the same tree. If (say) the medicine table is near the middle of the row being treated and two trays are used, the medicine man after preparing the doses takes one to the end of the row, and, with an assistant generally, doses the trees in their proper sequence; when he gets to the table again he takes the second tray and continues along the row. Thirty trees are usually treated at a time and the operations are necessarily rapid. The generating dish for a tree is taken from the last tree treated under the same cover, that is, the tree immediately behind; the old contents are emptied on to the ground and the dish used for the new charge without so much as a rinse.

When trees requiring the use of derrick poles are treated, the dose for each is separately prepared.



MEDICINE TABLE.—Note the two medicine trays each with its double row of acid and cyanide cups. The two vessels on ground are the "bean pots" mentioned. The paper tacked to the frame at back of table is the plan of the orchard showing weight of cyanide to be given each tree.

Lights.—Bennett's men who change covers work without lights even on the darkest nights, they finding the catch places, as already stated, by the sound of the jinglers. His medicine men have torches at their tables and carry lanterns on their arms when dosing. The changers of the Riverside county outfit, whose work is chiefly with very large trees, have miners' lamps attached to their hats. In appearance this seems a dangerous practice, but the men say that experience has proved it safe and satisfactory.

Fumigation Wagon.—A special wagon is deemed a necessity by most of the fumigators, but a contractor may have only one to move

his various outfits. Bennett's may be taken as a type. It is a rather long and wide, medium weight, spring wagon, designed to be drawn by two or more horses. The platform is reserved exclusively for the covers and poles. Across the back of the wagon from side to side is a box-like arrangement about two feet wide and three high; this is open only behind and is divided into three stories, or in other words has two shelves between the bottom and the top. Here the generating dishes are placed for transport, and they are kept from slipping out by cleats across the opening. A stout piece of deal projects from each side of the platform behind the dish box, and to these the medicine table and its appurtenances are bound. From the side beams of the wagon on the underside midway between the two pairs of wheels is suspended by iron stringers a platform for the case of cyanide on one side and the carboy of acid on the other. Thus there is a place on the wagon for each item of the outfit, and the arrangement is such that the covers are not endangered by the chemicals.

Number of Men Employed and Pay.—Two changers and one medicine man working with sheets can do about three hundred trees under fifteen feet in the course of one night when working in solid blocks of trees; with the assistance of a fourth man, an additional hundred trees may be done. At least four changers and a medicine man are required when the work is with derrick poles, and from thirty to one hundred trees according to size is all that can be done in one night.

The men are paid by the hour. The medicine men generally get about 1s. 3d. per hour and the changers 10d. to 1s. The Riverside commission foreman receives 1s. 7d. an hour and his assistants 1s. These prices seem high to the South African farmer but must be paid for good workmen in California. Only white men were employed on the outfits which I saw. Ten hours constitute the average night's work, and that the men work well during the full time may be judged by the work they accomplish.

The Riverside commission has a horse trained to assist the men in removing large covers from the trees. This innovation saves the men much labour; they have only to make a large hitch about the cloth and instruct the horse to pull. He knows the business so well that no injury befalls the sheets or the trees.

The contractors and the horticultural commissions engaged most extensively in fumigating employ one or more men for the sole purpose of keeping the covers in repair. These menders go from outfit to outfit and take a sewing machine with them to facilitate their work. As theirs is day work it does not interfere with that of the fumigators.

Table of Quantities.—None of the fumigators whom I met made use of a "a table of quantities" to aid them in deciding the proper dose of chemicals for a tree; all of them from long experience in fumigating felt competent to judge offhand what should be given. Their doses, however, are close to the measures recommended in our Cape fumigation tables, except that they are somewhat larger for trees under fifteen feet. It is probably necessary for the Californians

to dose heavier than we on these small size trees owing to their using covers of much lighter material. Most of the fumigators try to use as much cyanide as the tree will stand without serious injury and not the least that may be used to destroy the scale.

Charges for Fumigation.—The horticultural commission outfits charge for their work at the actual cost plus about ten per cent. to cover wear and tear on the apparatus. The contractor fumigators sometimes undertake to treat an orchard for a stipulated amount, but the general way is for them to charge for the chemicals at a very trifling advance over the actual whole-sale cost, and then to complete the account by a schedule charge for the covering of the trees. By "covering" they mean the labour of the fumigation process, and the amount charged includes all the expense and a margin for profit. The schedule charge for covering varies with the size of the sheet it is necessary to use, and with the circumstances. For straight away work in orchards necessitating a full night's work or over, a prominent contractor whom I met told me his charges were as follows:—

For 24 foot sheet,	... ...	4 to 5 cents.
For 36 foot sheet,	... ...	5½ to 6 cents.
For 44 foot sheet,	... ...	7 to 8 cents.
For 55 foot sheet,	... ...	20 to 25 cents.
For 64 foot sheet,	... ...	25 to 30 cents.

Work with larger sheets is charged for at special rates; and in small orchards an advance of thirty or more per cent. is made on the schedule. The great increase in price between that for work with 44 foot sheets and that with 55 foot, is due to derrick poles being necessary in the latter case. A cent may be taken as equivalent to a half-penny. The total cost of doing a tree twelve feet in height at the prices charged and with the chemicals at the Californian cost is just about 6d.; but it must be borne in mind that many hundreds of trees must be offered for treatment and that the trees must be about of a size to get this price.

The Californians get their cyanide from a branch of a German firm. The cost delivered in the State is a penny or two a pound more than the figure at which our Government supplies Colonial fruit growers. Sulphuric acid is very cheap in California. It is bought direct from the manufacturers in very large drums, and is transferred to immense glass jars cased in wood (carboys) for carriage to the scene of fumigation.

Season for Fumigation.—Very little fumigation work is done after the winter rains begin. The operators then find employment as pickers and packers of the fruit they have aided in saving. The fumigating is started again as soon as the eggs of the Black Scale begin to hatch; this varies with the season from July to September. Where the fumigation is for the Red Scale only, work may be started much earlier, but ordinarily the fumigation season is from September 1st to January 1st.

Repetition of Fumigation.—There is a saying in California "Once Red Scale always Red Scale," and about Los Angeles the truth of this does not now appear to be disputed. Experience has proved to the growers that fumigation is almost but not wholly a perfect remedy, and that repetitions of the treatment are necessary after an interval of one or more years. In general, fumigation every second year seemed to me from what I heard and saw to be necessary to keep the scale in suppression in orchards where it had once secured a firm hold. The source of the re-infestation is generally doubtful, but it is said may sometimes be traced to fumigated trees where the scale was deeply massed; whilst as a rule it is attributed, with what truth it is almost impossible to ascertain, to infection from outside the orchard conveyed by birds, insects, or still more uncertain and unconscious agents. However, it is now accepted that no matter how carefully the fumigation is conducted the scale will show again in the orchard within a year. Some fruit growers, I was told, have their trees treated regularly once a year, scale showing or not.

In Riverside County absolute eradication of the Red Scale by one fumigation is claimed, and the claim backed up by careful records of all the trees which the Commission has found it necessary to have treated. But the system of orchard inspection is such in Riverside that an infested tree is certain to be discovered before the scale has become massed; and the tree is at once treated. Then, as has already been stated, the Red Scale has never become so thoroughly established in the county as it has in Los Angeles, and therefore the chances for re-infestation from shade, ornamental and deciduous tree sources are far more limited.

The Californians have demonstrated that they can grow citrous fruits at a profit in spite of the heavy expense of fumigation, and they realize that they may have to keep on fumigating for an indefinite time. Their hope, as is ours, is that efficient natural enemies of the scale insects that make fumigation necessary will soon be found. They have a number of examples of pernicious scale insects disappearing almost entirely before natural enemies and are therefore naturally optimistic. At the time of my visit, the State Board of Horticulture had a man travelling in Australia and other far eastern lands for the express purpose of searching for Red and Black Scale enemies.

Conclusion.—South African fumigators are cordially invited to write to this office (Office of Entomologist, Department of Agriculture) for further particulars on any of the Californian fumigation practices mentioned which they think they might like to introduce into their work. It is especially recommended that changing poles be adopted for small sheets.

It is not out of place to here mention that a few colonial parties have fumigated for the White Peach Scale (*Diaspis amygdali*) and consider the remedy economical and satisfactory. If light weight sheet handled with changing poles were used, it is probable that the gas treatment for this scale would become popular with a large

number of our fruit growers, although it is not likely to entirely supersede spraying with lime-sulphur-salt mixture since this tree wash acts against the leaf curl disease as well as the scale.

CHAS. P. LOUNSBURY,
Government Entomologist.

Failure of Citrus Trees at Lourensford.

In connection with the reports and correspondence on the above subject, published on pages 662-665 of the *Agricultural Journal* of the 22nd November, 1900, the following contribution by the Conservator of Forests, Western Conservancy, is published for the information of our readers. The Editor invites discussion on the subject through the columns of the *Journal*, and will be glad to be favoured with the opinion and experience of other growers of Italian trees :—

In the *Agricultural Journal* of the 22nd instant I notice two reports on the decayed citrus trees at Lourensford; the first report by Messrs. Nicholson, Van der Byl and Mayer, the second by Messrs. MacOwan, Pickstone and Pillans. Neither of the reports offers a complete reason for the total failure of the Italian and English citrus trees, while the adjacent Cape and Australian trees remain quite healthy. The second report suggests as causes of failure :—

(1) The working upon layered instead of seedling stocks.

(2) Unsuitable varieties to Cape conditions of culture.

The real reason of the cause of failure has possibly been overlooked, namely, climatic. There are differences between the climates of the Cape and England or Italy, while the Cape and Australia, in the same latitude and situation, have practically identical climates. There is, of course, a wide difference between the English and Cape climate, but even between the Cape and Italian climates there are considerable differences. Temperatures in Italy would generally be lower in winter and higher in summer than at Lourensford. Insolation would be greater in Summer in Italy, and less in Winter.

After cultivating here trees from Australia, Southern Europe, Japan, the Himalayas, &c , for many years, I have come to the general conclusion that, while all Australian trees will grow somewhere in South Africa ; Japanese, South European and Himalayan succeed only in the case of certain species. North European trees will only succeed by virtue of their being also South European. The general position is that trees from the fertile climates of Japan, the Himalayas and Europe are but half-hardy exotics in the dry climates of Australia and the Cape ; and, *vice versa* (though to a less extent), with most of the Cape and Australian trees when grown in a damp, fertile climate.

It has begun to be recognised at Kew that even in the great temperate house there, Cape and Australian vegetation is better kept apart from Japanese, Himalayan and South European.

The causes of the failure of the Lourensford trees mentioned in the second report may or may not be contributory; but the main reason of the failure is probably climatic.

D. E. HUTCHINS, F. R. Met. Soc.,
Conservator of Forests.

Nov. 30th, 1900.

Mulching.

"The reader will find (says Weathers' *Garden Plants*) this expression used many times in connection with the cultural directions given for various plants. It is therefore advisable to explain its meaning and value.

A 'mulch' or 'mulching' in gardening language means an extra covering of soil, rotten leaves, or manure, either separately or combined, placed over the roots of plants either after the latter have been newly planted, or at any period during their growth when it may be considered advisable.

The advantages of mulching may be summed up as follows:—

(i.) During the hot and dry summer months it prevents excessive evaporation from the soil and thus not only preserves the moisture for the roots to absorb, but it also prevents the soil from becoming excessively hot by day, and cold by night, thus maintaining a more regular temperature.

(ii.) In winter it protects the roots from frost and also keeps the soil warmer.

(iii.) When a rich mulch is applied to newly planted trees and shrubs, it not only has the above advantages, but the manurial matters contained in it are washed down into the soil and enrich it with food for the benefit of the newly formed or forming roots.

(iv.) A good mulching of rich manure to all kinds of fruit trees after they have set their fruits is highly beneficial in assisting them to swell rapidly and ripen more quickly. Once a plant—no matter whether a tree, shrub, or annual—begins to develop fruit and seeds, a demand is made upon its reserve materials. If these are not quite sufficient to meet the demand, it is easy to conceive that the extra food supplied by means of a good mulching will supply the deficiency."

On the subject of winter mulching the *Fruit-grower* remarks:—

"Do winter mulches do harm or good? This may seem a curious question to many readers, but there is so much difference of opinion as to what constitutes a mulch that we are not surprised such a question should be put. Some say winter mulches do harm, that

they are cold, or keep the soil cold, and consequently retard growth. Well, that again depends not only upon the nature of the mulch, but the season. What is a mulch? Well, a mulch, broadly speaking, may be made of anything almost, used as a covering round the roots of a bush or tree, or on the top of a bed. In summer we put on a mulch to certain crops to keep the roots cool, and that coolness comes from preventing the heat of the sun striking into the soil covered. It retards maturity, and is useful to that end, always provided that mulch is damp and of a lower temperature than the soil itself. Now, with regard to the winter mulch. Does it retard growth and do harm to crops? That, to a very great extent, depends upon the nature of the mulch and the conditions. For instance, a man claims that a winter mulching of stable manure acts as a cold sheet and retards growth, but, at the same time, he fails to see that a mulch of stable manure may not, properly treated, be itself of a lower temperature than the soil. If not, how can it retard growth? Take our mulch; it is composed of stable manure and loam, well mixed. It would never do to say that the application of such a blanket in winter time to the strawberry bed and plant could keep them cold and thus retard growth. On the contrary, it would protect the rootlets from a very severe and destructive frost, and furnish them with a good supply of plant food at the same time. We claim that the free use of this mulch, made up as it is of short stable manure only and loam, is productive of wonderful results, and especially when put on strawberry beds which are two years old and more. No grower can test this method without seeing that the improvement in the health of the plants and the size and quantity of the fruits are most marked, and when once used it will never be discarded. We quite agree that to throw on a lot of hard cakes of coarse manure loaded with straw and general refuse may retard the growth of an asparagus bed if it is done under certain conditions, but even only then. In winter, that is, when wintry weather prevails, the soil is as cold as it can well be, and whether wet mulch be put on or not will not make any difference. In open weather it is well, naturally, for the air and light to act on the soil; that is why such a mulch if used should be removed when the weather is open, to induce early growth."

Cuban Tobacco.

The best tobacco in Cuba is grown in the district known as "Vuelta Abajo" in the province of Pinar del Rio, and in parts of the province of Havana, and a fair class is also raised in the province of Santa Clara. Almost all the above is exported through the port of Havana. An inferior grade of tobacco comes from the eastern provinces, and is exported through the ports of Gibara on the north and Santiago on the south side of the Island.

Tobacco plantations on a large scale are quite the exception, as no machinery is required, and the success of the crop depends very largely on the personal attention and care bestowed upon it by the cultivator, for which reason the industry is specially suited to the small farmer class. The only capital required, outside the value of the land, is, for agricultural implements, working bullocks, and materials for drying and curing sheds, which are usually of the most primitive description, and respectable men who know the business can always obtain these locally on credit, the more so as the crop comes to maturity in a comparatively short time.

Great activity has been shown in this direction in the past year, and employment has thus been found for many people who had been ruined by the war, with the result that the crop of 1900 will probably be exceptionally large. An estimate published by the Secretary of the Agricultural Commission of Pinar del Rio in March of this year, puts the probable yield of that province at 500,000 bales, averaging between 90 and 100 lb. each, and the extent of land under cultivation at 38,700 acres, equivalent to a yield of about 1,230 lb. per acre. As this would be nearly double an average year's crop, I am inclined to think that the estimate is perhaps a little too sanguine.—*Foreign Office Report, July 1900.*

Effects of Bad Culture.

We have so persistently dealt with the importance of good cultivation that a few notes on the ill-effects of bad culture may be appropriate at the present time. In nothing is it more marked than in the quality and appearance of the product put on sale. That is an easy matter to prove.

Badly Grown Apples.

Take the apple. Under good cultivation, what happens? The fruit not only assumes goodly proportions, but it puts on a high, rich colour; there is less core, more flesh and a larger yield. It is thus quite possible to say whether fruit has been produced by good or bad culture simply from the appearance of the specimens and the yield. Now, under bad cultivation the results produced would be the reverse of those referred to above, and, in addition, growers must bear in mind that the loss incurred through neglectful treatment is a very serious matter to them. The effects of bad culture with apples is thus of a very serious nature.

Badly Grown Tomatoes.

Then there is the tomato, and here we have a fruit which shows the effects of bad culture more clearly than any other thing grown. Under bad culture the fruit is small, the skin thick, the specimens

contain a lot of green fleshy material, which is of a very unwholesome nature, and there is a lack of sugar. As against this, when well dealt with, the fruit swells out to a fine size, the flesh becomes firm, there are less seeds, a very fine thin skin, and, from a dietetic point of view, hardly any loss at all. In the majority of cases, the tomatoes sent into our markets are raised under improper conditions, and are badly grown. We are quite aware that this seems a strange and sweeping thing to write, but it is not out of the way, nor opposed to facts, as anyone and everyone acquainted with the market knows. Bad culture causes the loss of hundreds of pounds' worth of plants every season, and the loss on the sale of fruits grown under this system is incalculable. It is not necessary to prove this by an appeal to an elaborate array of prices, but when we say that the value of tomatoes grown by bad culture is often 50 per cent. lower than that of fruit grown by skilled producers, further argument is unnecessary.

Badly Grown Plums.

In the plum we have another fruit the ordinary culture of which furnishes us with a good object-lesson. Why is it that we find so many small, badly-formed and partially-coloured plums in the windows of the retail fruiterer? We say, "Because of bad culture." But it may be asked, "Do you mean to assert that bad culture is the cause of these defects?" To which we reply, "In the majority of cases, yes." Further, it may be urged, with regard to colour, "Surely this is a defect which is absolutely due to want of sun?" but we can only agree conditionally as to that, for, after all, good culture will ensure sufficient sun heat to colour the fruit in most seasons by having open-headed trees, though there are methods by which the maturity of fruits can be hastened. The fruit from trees which receive heavy and regular supplies of stable manure will always be slow in coming to maturity. That is a fact about which there can be no question. It furnishes us with one of our reasons for condemning the use of this highly nitrogenised material, and as we have settled this point by careful and elaborate tests, extending over a number of years, we are quite prepared at any time to maintain our position in this respect. Dose your tomatoes with this material and what happens? Why, the wood of the plant and, later on, the flesh of the fruit suffers from a soft, dull and insipid condition, which affects the quality of the fruits of the whole crop.

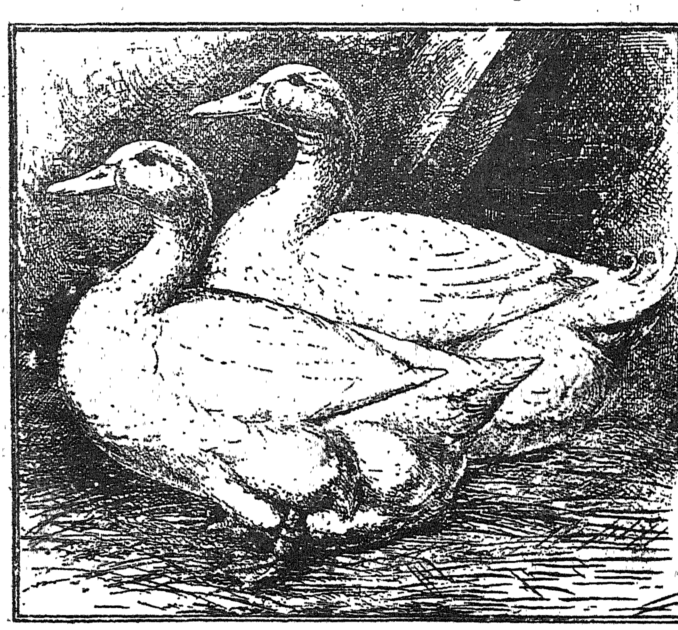
The Triumph of Good Culture.

We have made great advances in the past, but there is still room for progress and improvement. The past representatives of "the art which doth mend nature" have, for instance, taken the diminutive, little, wild strawberry from the woods and thickets, and by the medium of good culture, turned it into a bold, beautifully-coloured and magnificent fruit. But that is not all. Good culture

has produced better effects than these upon the wild strawberry. It has given it a firm and fragrant flesh. It has increased the sugar considerably; in fact, good culture in respect of the strawberry has changed an almost useless berry into one of the most important fruits grown. We wonder what Pliny, who knew this fruit as an insignificant and unsweetened seed berry only in his day, would say if he could but see some of the mammoth strawberries which are now brought even within reach of the poorer classes? And this is one—and only one—of the lessons of good culture. —*Fruit-grower.*

MISCELLANEOUS.

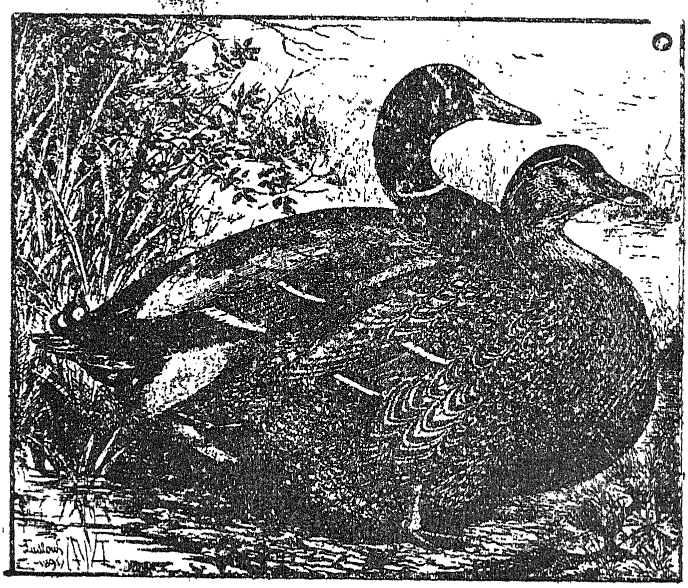
Ducks and Duck-breeding.



AYLESBURY DUCKS.

In this article it is proposed to deal with what may be termed the economic breeds of Ducks, for though there are many other varieties, including some of great beauty, in addition to those described below, they are ornamental rather than useful.

Some old writers speak of the Aylesbury duck as the White English, designating the Rouen as the "common" duck. But in the early part of the nineteenth century the name Aylesbury was given to the white variety, owing to the fact that it was extensively bred in the Vale of Aylesbury, until recent years the chief seat of the duck breeding industry. For nearly a century the variety has supplied ducklings to meet the demand for those delicacies in the early months of the year, and for this special trade it has practically no rivals among the pure breeds of our own or any other country. The chief reason for its superiority in this respect is its rapid growth. Ducklings can be produced ready for killing within seven to nine weeks from the day of hatching, and weighing four to five-and-a-half pounds. As the season when prices for ducklings rule high is early, quickness of growth is an important factor to the breeder, especially as ducks are heavy feeders. The bones in this breed are very light, and there is comparatively little offal, the flesh being well



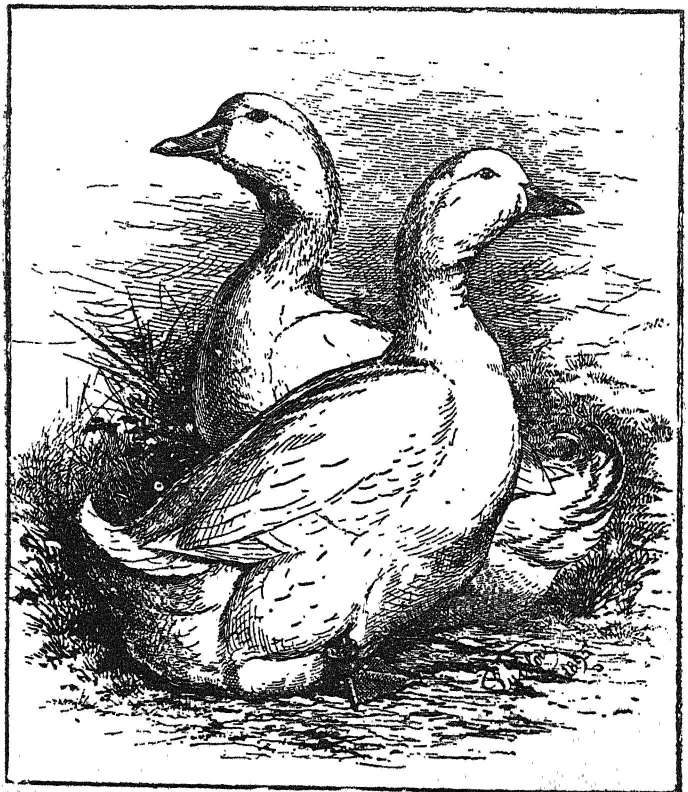
Rouen Ducks.

placed and light in colour. Adult drakes weigh about nine pounds, and ducks eight pounds, but for breeding purposes a pound less in each sex is no disadvantage, provided that the frame is large and well developed. The ducks are excellent layers of large-sized eggs, of which they frequently produce considerably over a hundred and twenty per annum.

The Rouen Duck.

The name given to this variety of duck would appear to indicate that it originated in Normandy, but there is no direct evidence to

this effect. In economic qualities the value of the Rouen is very great, but it does not equal the Aylesbury in so far as early maturity is concerned. It is much slower in development, and during the early period of growth is engaged in the building of frame rather than the production of flesh. Hence it is not suitable for the



PEKIN DUCKS.

duckling trade, but it provides larger specimens than the Aylesbury. It is, therefore, chiefly kept for the summer and autumn duck trade. The flesh is excellent, very full in flavour, and, when the bird is fully grown, very abundant. The flesh is much darker than that of the Aylesbury, but is richer than that of any of the other species. This duck is a good layer of large-sized eggs, but it does not come into profit so early as the breed just named. Fully matured specimens weigh: drakes, 10 lb., ducks, 9 lb.

THE PEKIN DUCK.

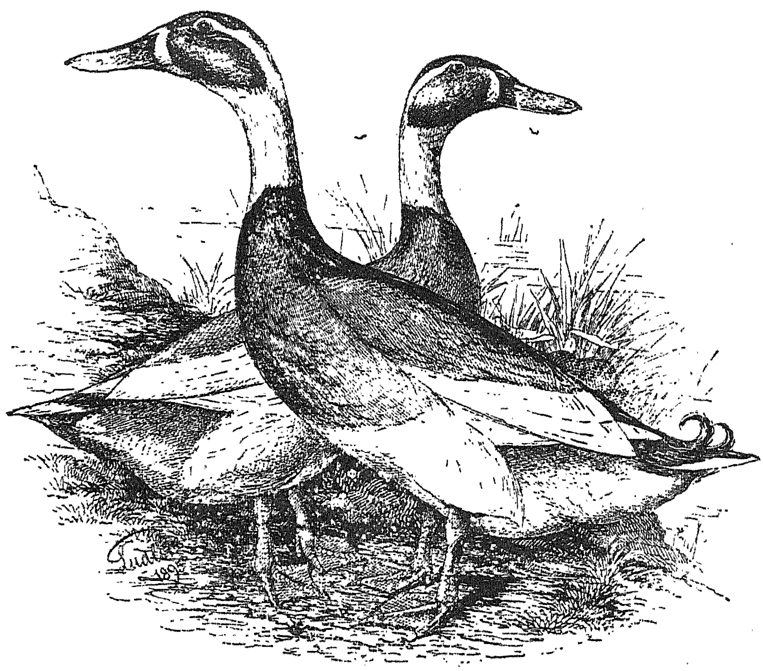
This breed was first introduced into Britain in 1872, direct from China, but was not then brought publicly forward, and it was not until two years later, when other importations by way of America

took place, that it fell into the hands of poultry-breeders, who at once perceived that it differed from any variety of duck then known, and possessed special characteristics. The attractive appearance, prolificness as layers, natural vigour, and apparently large size of the new birds speedily won popularity, and for a time it seemed that they would take the place so long occupied by the Aylesbury. Close-breeding and want of fresh blood had somewhat enfeebled the last-named variety, reducing the fertility of the eggs and the vigour of the ducklings. Their wonderful laying powers soon made the Pekins popular, and they supplied an influence much needed for crossing with the Aylesbury, which, while for a time affecting the purity of the last-named breed, has been of permanent benefit, so far as vigour is concerned. It cannot be said that of late years the Pekin has maintained its position, for it has proved to be not nearly so meaty as was supposed, and flesh qualities are now regarded as of greater importance than egg production. Though often larger in frame than the Aylesbury, it does not carry the same quantity of flesh, and an adult specimen generally scales one to two pounds less in weight. The reason for this is that Pekins do not readily lend themselves to fattening, and in America, where they are extensively bred, but where the quality of flesh in table-poultry is not equal to that met with in Europe, it is found that they require two to three weeks longer to attain to killing age as ducklings than do the Aylesburys, while as adults they are only moderately fleshy, as can be seen at the dead poultry shows. As with fowls that are specially prolific as layers, excess in that direction is not accompanied by great meat production. Hence the flesh is neither so abundant nor so good as that of the Rouen and Aylesbury. Their chief value is as egg producers. But for crossing with the Aylesbury they are very valuable, and the progeny of such a cross are often larger and quite as rapid in growth as the pure Buckinghamshire breed.

The Indian Runner Duck.

Within the past decade a variety of duck to which the name "Indian Runner" has been applied has met with a considerable amount of favour. But for something like fifty years ducks of this type have been kept in Cumberland. Its origin is somewhat doubtful. All that we really know on this point appears to be that a drake and a trio of ducks were originally brought from India by a sea captain, who landed them at Whitehaven and presented the lot to some farmer friends in West Cumberland. A few years later another consignment was imported, and it is claimed that from these two importations all the present stocks have descended. Attempts have been made to trace the port of embarkation, and to discover where similar ducks can be obtained, but in vain. The term "India" may mean East or West, and does not materially help us. Upon the farms of Cumberland ducks of this type are to be freely met with, and they are greatly in favour because of their wonderful laying powers, which are greater than of all other races of ducks. The

eggs are about the same size as from hens. The birds are usually hardy. For table purposes they are small, adults weighing 3½ to 4½ lb., while ducklings would be about 2 lb. lighter; their flesh, however, is excellent, and if a trade in small ducklings could be created they would meet a need. As the name indicates, they are excellent foragers. In appearance the Indian Runner is peculiar.



INDIAN RUNNER DUCKS.

Combined with the long, upright body, as in the Pekin, it has a very fine long neck, and its head and bill are also long and fine. The body is not so deep as in the breeds already described, much more of the leg being seen. There are two colours: (1) the fawn, and (2) the brown and grey; the former is generally favoured. The head, breast, back, wings and tail in drakes of these varieties are fawn or brown and grey respectively, with white neck and sides in each case, but the ducks are pencilled.

THE MUSCOVY DUCK.

This variety has been known for more than three centuries, and it appears to have received at various times two other names, the Peruvian and the Barbary duck. The name is said to have been given in honour of some merchants in the sixteenth century, called the "Muscovite Company," but the general impression is that the

term is a corruption of Musk Duck, so called by reason of the odour of the bird before it is cooked. The breed has, however, never become popular, firstly, because it is not pleasing in appearance, and, secondly, it has so bad a temper that other fowls can scarcely be kept where it is. The birds are, on the other hand, wonderfully tame, and will answer the call of anyone with whom they are familiar, but they are great wanderers, and sometimes remain away several days. For this reason they cannot be kept in confinement, but must have freedom. They grow to a very great size, and drakes will often scale 12 lb. when matured. As layers they are somewhat uncertain.

The Cayuga Duck.

Several attempts have been made to popularize the Cayuga duck as an economic fowl, but without success, its small size and dark flesh being serious disadvantages on our markets. It is excellent in meat properties, the darker coloured flesh and full flavour enabling it to take the place of the wild duck. As a layer, except where enfeeblement has resulted from close breeding for exhibition purposes, it is very good indeed. Crossed with the Pekin, it makes a very meaty bird for the table. The body is long and wide, with a flat back and very deep breast; the thighs are short and plump, and the legs short, strong and small; the neck is long, and the head and bill long and rather narrow; the plumage is bright metallic black; the legs and feet black or smoky-brown, and the bill blue-black; adult specimens weigh 6½ to 7½ lb.

Breeding.

The breeding of ducks is especially suited to those who have only a limited amount of space at command, but it is also a branch which can be followed by the farmer, notably where the soil is light and of a gravelly nature. As a general principle, it should be realized that the breeding stock must have access to water in which to disport themselves, and the progeny are much stronger if the parents have liberty. Consequently, in the duck breeding centres small occupiers who hatch and rear the ducklings do not keep the stock birds, but purchase eggs for hatching, and this plan can be generally recommended, as it enables many to undertake the rearing who would not otherwise be able to do so.

Hatching and Rearing.

By nature, ducks are not good mothers, and the best layers are late in desiring to sit. It would, therefore, be very risky to depend entirely upon them. As a rule, hens are employed for this work, but the eggs should be moistened every day when the hen is feeding. Otherwise there is danger, especially in a dry season, of death in the shell. Eight or nine eggs can be covered by a large bodied hen. Incubators are also largely employed, and the eggs should be

moistened daily as already recommended. The period of hatching is twenty-eight days.

Ducklings do not need brooding so long as chickens. They must, however, be kept in a warm place if taken from the mother when hatched under natural conditions, or live in a brooder for about a fortnight, though during mild weather the time may be shortened to ten days. They should be divided into flocks of about twenty-five each, and accommodated in small houses or in separate compartments of a larger shed. Under the last-named arrangements the divisions should consist of boards about two feet in height. For twenty-five birds a house six feet by four feet is quite large enough, even when nearly at a killing age. In front of the house or shed a small yard must be provided for feeding, and, where movable houses or sheds are employed, wire netting, two feet wide, held by stakes thirty inches long will prevent their egress. Ducklings which are intended for early killing are not given their liberty, and they thrive better for the short period of life if denied access to water in which they can swim, but some breeders allow them to have an occasional bath. Where it is intended to grow the ducklings as breeding stock, freedom of range and access to water are essential to vigour of constitution, but in that case the growth is much slower. For the former purpose, especially during colder weather, they are kept in the house or shed for the greater part of the day, only going into the yards three times a day for feeding, when the straw upon which they rest is shaken up or renewed. Their place of abode must be kept clean and be well ventilated, otherwise great loss would occur through disease. It is desirable, where possible, to use different ground each year, or, on small holdings, to give the runs a rest for several months.

FEEDING.

Ducks are rather gross feeders, and recent experiments in America have supported experience on this side that nitrogenous food is essential to ensure a plentiful supply of eggs and fertility. Their natural food consists largely of slugs, etc. Hence, meat is desirable. During the breeding season old ducks should not have food of a fattening nature supplied to them. The most suitable food is barley meal mixed with an equal portion of thirds or fine sharps, and with this should be mixed some cooked lean meat. Butcher's offal, when not fatty, is excellent for the purpose. The food should be given warm, and of the consistency of stiff porridge. Where the birds are at liberty, they only require two meals per diem, early in the morning and about an hour before dusk. Near by must be water for them to drink, or they will not feed properly.

In feeding ducklings, as great a variety of food as possible should be supplied. Barley meal, cheap oatmeal, boiled rice, each with about one-fourth of fine sharps, will afford change of diet. But with these should be mixed cooked lean meat or tallow greaves. In the duck districts the last named are largely employed, but in many

districts carcases of animals can be obtained. If the ducklings are to be grown as breeders, the food recommended is continued until they are fully matured. Indian meal is often used on account of its low price, but it is deficient in albuminous elements, and must be largely fortified in that direction. Hence it cannot be recommended, and is not as cheap as many appear to think. Where the ducklings are to be killed at an early age, the system referred to is only continued for five weeks, when it is changed with the object of filling up the frame.

Fattening.

The final stage of preparing ducklings for market is one of very rapid development. By this time they have grown considerably, and will nearly fill up their house. The food which yields the best result is rice properly cooked and mixed with about one-fourth its bulk of tallow greaves or meat. At this period more fatty material is essential to soften the flesh. Barley meal, buckwheat meal and Indian meal are often used instead of the rice, but they do not yield the same result. In preparing the rice, of which that from Burma is the best, and when in the rough, one gallon of the rice should be added to four gallons of water and about 4 lb. of the greaves or meat. This is gently simmered until the rice has absorbed all the water, when it is soft, yet not a mush. In order to aid digestion the birds must have a plentiful supply of coarse grit or fine gravel, without which much of the food will be lost and the ducklings will not fatten, the cost of production being thus greatly enhanced. Green food is also valuable, and any garden stuff is good for the purpose. The birds are fed three times a day, and the object is to encourage eating, so that quick growth may be secured. During warm weather nettles are often boiled and mixed with the food, as these weeds keep the blood cool. Upon rice given as recommended ducklings are produced weighing from 4 to 5½ lb. at eight to nine weeks old. Rapid growth is essential to success in the duckling trade. The birds must be killed before they are nine weeks old, for then there is a change of feather, which, when completed, reduces their market value, as they are no longer regarded as ducklings. The chief demand for ducklings is from February to July.

Killing and Plucking.

When sufficiently fatted the birds are starved for twenty-four hours and killed by dislocation of the neck. Plucking should take place immediately, whilst the body is warm. If killed at the right age the feathers come out easily and cleanly. During the cooling process the birds should be placed under boards and weighted, to compress the body and force the meat on to the breast. They must not be packed until quite cold, otherwise quality is lost. Feathers should be carefully sorted, and are of considerable value if divided into (1) down, (2) back of neck, and (3) wing.

E. Brown, in *Journal of Board of Agriculture.*

Locust Parasites.

Reports from various well-authenticated sources having, from time to time, reached the Government as to the good work being done by a certain small white fly in the destruction of locusts, the Secretary for Agriculture has caused an enquiry to be made as the identity of these insects.

From an examination conducted by the Government Entomologist of certain locust parasites to which attention was drawn by the Resident Magistrate at East London and Mr. W. R. Ellis, Inspector of Locations, it appears that the locusts are attacked by two different families of flies. Both deposit small whitish eggs at the back of the shield or under the wing of the living locust, and the grubs of these work into the fleshy parts of the insect and eventually leave the body to become puparia. From these the fly appears.

Several dead locusts, of the *Pachytylus* or "Khaki" species, forwarded by Mr. Harding, Field Cornet at Bongolo, were also examined by Mr. Lounsbury and were found infested with these maggots and puparia. Nearly all the locusts were devoid of body contents, the fluids having been quite exhausted by the maggots. One of the living locusts was also found to be hollowed out.

Steps are being taken to hatch out some of the maggots in the hope that the determination of the species may be made from the flies obtained.—EDITOR.

British Trade in 1900.

LONDON.—*The Times*, in its annual trade review, says:—

It is evident that the tide of prosperity which commenced to flow in 1896 reached its high water mark in the past year. The ebb, which was scarcely perceptible when the year turned, became more pronounced towards the closing days of the century. Manufacturers both in the hardware and textile branches of trade were severely penalized by the high level of values which raw products attained, and being less favourably situated than some of their foreign rivals have felt keenly the effects of such competition. The prolongation of the war has kept the labour market bare, and in some industries the dearth of efficient hands was complained of. Such conditions have naturally led to the payment of higher wages, which tended to increase still further the cost of production; but the lessening volume of trade or the inability to work at a profit without additional relief in the cost of raw material has latterly led occasionally to the adoption of short time or to a reduction in the number of workpeople employed. The competition most severely felt was that of America and Germany, the commercial agents of which countries have shown extraordinary energy in securing orders. In the first-named country

the trade has obtained additional advantage by the adoption of all the latest labour-saving appliances and the most modern machinery. Consequently, although the rate of pay in the States is much higher than in this country, such extra cost has been far more than recouped in the much larger amount of work obtained per man.

The effects of the high wages and the exorbitant cost of fuel have been especially marked in the iron and steel manufacturing sections, and shipbuilding has been checked thereby. Malleable ironmakers have had to see orders go by them, and pipemakers who entered the year with full order books had exhausted the supply at the close. Locomotive engineers and boilermakers, however, still have a large reserve of orders, and those engaged in the manufacture of armour, projectiles, and such warlike articles have nothing of which to complain. How severely the rise in coal has influenced the metal industries may be gathered from the fact that each rise of 1s. per ton in fuel means an additional cost of 5s. per ton in the manufacture of iron, and coal prices have averaged fully 8s. per ton above the depressed level of 1894. The demand for coal has not been so great since the early seventies, at times quite a famine prevailing not only at home, but on the Continent also.

The woollen industries were to a great extent demoralized by the heavy depreciation which occurred in the value of the raw product, but the effects of this have been less mischievous in this country than on the Continent, the speculative purchases made by our manufacturers having been by no means so heavy as those of the French and German houses. The flannel and blanket making branches have to a great extent escaped the ill-effects, in the first place being well employed on Government contracts, while, in the second place, the value of the wools which are used in these sections has undergone less violent fluctuation. Lancashire has suffered from the dearth of cotton supplies, which led to a curtailment of production in the early autumn. It is many years since stock became so attenuated, and speculators naturally took advantage of the position to hoist values. Middling American cotton touched $7\frac{3}{8}$d. per lb., but manufacturers by restricting the purchases successfully overcame the difficulty, and the results of the year's trading are turning out eminently satisfactory, in spite of the upheaval in China and the existence of the most severe famine ever experienced in India. Notwithstanding a depreciation in the price of hides resulting from the heavy supplies forwarded from the famine-stricken districts of India, best leathers have remained dear and the margin of profit in the manufacturing industries generally narrow. In this department, also, benefit has been derived from the war, a strong demand having existed for all leathers suitable for military purposes. A shortage of raw material was complained of in the linen trade, which materially increased prices and threatened to curtail production.

Large profits were made in the timber trade by first hands, but importers found the year unsatisfactory, more especially in London,

where a congestion of dock stocks has caused much loss. The general consumption declined 10 per cent.

Foodstuffs have generally stood at moderate levels throughout the year, and thus the working classes have obtained full benefit of the high rates of pay, but the maintenance of those dependent on our soldiers ordered south has led to a reduction in their savings. The liberal donations of the wealthier classes also resulted in a curtailment of expenditure on articles of luxury, and this towards the close of the year began to affect values of such.

CORRESPONDENCE.

Frequent vs. Single Milking.

Can you inform me if there would be any difference in the yield of milk by milking only once instead of twice a day, and if it is advisable to milk only once? Sometimes the cows will be at a distance from the homestead, and it would be better for me if I could dispense with a second milking.

J. M. LAWRENSON.

Johannesfontein, Durbanville, July 31st.

It is a well-recognised fact that the secreting function of the udder is more active during the process of milking and suckling than at any other period. This is due to the influence on the nervous system which the pleasurable stimulus of milking or suckling produces. This pleasurable nervous stimulus causes increased supply of blood to the gland, and an increased activity of the gland cells, which correspondingly increase the amount of milk secreted. Hence frequent and regular milking will tend to maintain a larger influence on the secretion of milk than milking only once in twenty-four hours. *Vide Agricultural Journal* vol. xvii., No. 3, p. 151.

D. HUTCHEON, C.V.S.

GOVERNMENT NOTICES

Distribution of American Vine Cuttings—Season 1901.

The following Government Notice was published in the *Government Gazette* of the 12th instant:—

It is hereby notified for general information that the following are the arrangements made for the distribution of the American Vine Cuttings from the Government Plantations during the Season 1901.

1. All applications must be in writing upon printed forms obtainable from the Civil Commissioner and Field-cornets of the Division, and must be addressed to the local Board of Distribution for the District concerned.

2. Applications must be sent in to the Local Boards (addressed to the care of the Civil Commissioner) not later than the 18th of March, after which date no application can be received.

3. The Local Boards will thereupon allot the Cuttings according to the number estimated to be available, notifying the applicants in due course. Allottees must pay for the Cuttings allotted to them not later than the 18th of May, after which date all Cuttings not paid for shall be considered as not wanted, and shall be forfeited and held to be available for allotment to some other person.

4. The Distribution of Cuttings will commence as soon as possible after the 1st of June. Allottees will receive their Cuttings direct from the Nurseries, and will be advised by post of the dispatch of the same.

5. The Cuttings will be divided into two classes, according to thickness. Cuttings not less than 3-16ths of an inch in thickness and 12 inches long will be charged for at the rate of 10s. per 1,000. Cuttings less than 3-16ths of an inch in diameter will be charged for at the rate of 5s. per 1,000; the apportionment to be left in the hands of the Distributing Officer. All Cuttings will where practicable be delivered in double length.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pieuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent............................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..
Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent............................
(Inspector's signature)..
(Address)..
Date....................

Notice to Fruit-growers.

The Board of Horticulture, having deputed Mr. P. J. Cillie to visit during this season the Western Fruit Districts, with a view to framing a list of varieties suitable for cultivation in the different parts, hereby invite the assistance and co-operation of fruit-growers by affording Mr. Cillie every facility and supplying him with the desired information.

C. MAYER, Acting Secretary.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Sugar Beet Seed.

Enquiry having been made at various times for seed of the variety of Beet used for the manufacture of Sugar, a small consignment has been imported by the Government, and applications are now invited from persons desirous of making a trial of Sugar Beet growing.

The quantity of seed to be issued to any one person is limited to one pound (1 lb.), and a small charge of 1s. 8d. per lb. will be made unless the recipient undertakes to furnish this Department with a report in due course, giving full particulars as to growth, yield, soil, etc.

Applications, addressed to the Under Secretary for Agriculture, Cape Town, will be received up to Thursday the 28th February, 1901.

Show Fixtures.

Indwe Native Agricultural Society, March 1901
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday last, February 9, 1901, as telegraphed from Natal and by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lbs	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ d.
Aliwal North ...	0 10 0	1 0 0	0 12 6	0 11 0	0 12 6	0 10 0	0 12 0	0 10 0	1 0 0	0 1 0	0 0 10	0 0 10	0 1 6	0 2 6	15 10 0	0 18 6
Beaufort West ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burghersdorp ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cape Town ...	0 10 9	0 13 9	0 11 0	0 8 6	0 9 6	0 10 0	0 10 6	0 11 0	1 0 0	0 0 6½	0 0 6½	0 0 7½	0 1 7	0 2 3	17 0 0	1 4 0
Clanwilliam ..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Colesberg ...	0 12 6	...	...	...	...	...	...	0 12 0	1 0 0	...	...	...	0 1 6	0 2 6	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	0 15 0	...	0 17 6	0 9 0	0 9 9	0 15 9	0 18 0	0 12 6	0 15 0	0 1 6	0 1 0	0 1 0	0 2 9	0 2 9	22 15 0	1 6 6
Graaff-Reinet ...	0 13 0	0 18 0	0 14 6	0 12 6	...	0 13 0	0 18 0	0 12 0	1 0 0	0 1 0	0 0 8	0 0 7	0 1 6	0 1 9	13 10 0	1 1 3
Graham's Town ...	...	...	...	0 11 6	...	0 13 0	...	0 10 6	0 13 6	...	0 0 8	0 0 10½	0 2 6	0 2 6	...	...
Kimberley ...	0 13 0	0 16 6	0 15 0	0 14 0	0 13 6	0 11 6	0 15 6	0 12 0	1 0 0	0 1 0	0 0 10	0 0 9	0 2 0	0 3 0	17 10 0	1 1 0
King Wm's Town	...	...	...	0 15 0	...	...	...	...	0 8 0	0 0 7	0 0 8	0 0 8½	0 1 3	0 2 0	21 15 3	1 0 0
Malmesbury ...	0 16 6	0 15 0	0 12 0	0 10 0	...	0 9 0	0 10 0	0 9 6	0 15 0	0 1 6	0 0 7½	0 0 6½	0 1 6	0 1 6	16 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lbs.	B. Wheat. Flour. per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F Barley. per 100 lbs.	G Oats. per 100 lbs.	H. Oat hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle (Slaughter.)	Q Sheep. (Slaughter)
	£ s. d.	£ s. d.	£ s d	£ s. d.	£ s. d.	£ s d.	£ s d.	£ s. d.	£ s. d	£ s d	£ s. d	£ s. d.	£ s. d	£ s. d.	£ s d	£ s. d.
Mossel Bay ..	0 11 6	0 17	0 11 6	0 9 0	..	0 6 0	0 18 0	0 6 0	0 15 0	0 0 8	0 0 9	0 0 9	0 2 0	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	0 8 0	0 8 9	...	..	0 10 0	1 0 0	0 0 7	0 0 11	0 0 10	...	0 2 6	25 0 0	1 5 0
Port Alfred	...	...	...	...	...	...	...	0 7 0	0 6 6	...	...	..	0 1 6	0 1 9	.	...
Port Elizabeth ...	...	...	...	...	...	...	..	..	...	...	.	..	...	...	.	..
Queen's Town ...	0 12 3	0 17 3	0 14 6	0 14 3	0 12 3	0 15 0	0 15 0	0 12 6	0 12 0	0 2 6	0 0 9	0 0	0 1 6	0 2 6	...	..
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	.			...	...	.
Vryburg ...	...	...	...	...	...	...	..	...	...	...	..	..	.	...	...	...
Worcester ..	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...

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AGRICULTURE.

Reports and Prospects.

Victoria East, *Feb. 12th.*—Rain is again badly wanted. A few showers at end of month greatly revived the veld, but the grass has now a yellowish tinge, A good crop of mealies and Kafir corn may be expected from Tyumi ward. Stock on the whole are healthy and improving in condition. No signs of locusts in any part of the district.

R. FERRIS, C.C.

The Growth and Utilisation of Lucerne.

Papers and articles in praise of the good qualities of lucerne or alfalfa continue to reach us from countries in which the crop is extensively cultivated. The latest treatise on the merits and utility of this leguminous plant takes the form of a pamphlet, or bulletin, as it is officially termed, prepared by Mr R. Harcourt, of the Ontario Agricultural College, and published by the Ontario Department of Agriculture, and it can truthfully be said that there is much in the article that will interest and enlighten those who have still but an imperfect knowledge of the virtues and habits of the plant. The author concerns himself chiefly with the crop named, and endeavours to demonstrate its economic advantages, but it is evident that he has no desire to exceed warrantable and just limits in disclosing its claims upon farmers. As is gradually becoming better understood, the fundamental advantage of this plant is its immunity from the influences of drought. Once it establishes itself in the soil it is practically independent of surface supplies of moisture, its extraordinary rooting powers enabling it to derive the necessary moisture from the subsoil. The roots of this plant have been traced to remarkable depths, and in this pamphlet illustrations are produced showing the wonderful manner in which they penetrate and traverse the sub-strata. One example represents the face of an opening made to the depth of rather more than 13ft. in a field of lucerne, the soil a fine alluvium, and the roots are shown as having reached a depth of only 6in. short of the bottom of the cutting, although the crop was only four years old. As indicating the strength of the roots it is mentioned that the diameter of the main root just below the crown averaged a little less than half an inch. It is this phenomenal rooting capability that renders the crop so valuable in those countries of limited or uncertain rainfall, and as there are parts of England which may fairly be included in this list, it seems not a little strange that lucerne is not more extensively grown in the southern counties.

The drought-resisting qualities of the plant should commend it to the favour of farmers in those parts where season after season in recent times there has been a dearth of grass for stock and hay crops through long spells of dry weather; and all the more readily should this be so when it is recognised that the known requirements of the plant as to soil and climate can in a large degree be complied with in many districts. A tolerably dry climate subject to a liberal amount of sunshine is best adapted to the growth of the plant, and judging from its success in Canada, it does not seem liable, when once established, to contract injury from severe frosts in winter. Lucerne flourishes most luxuriantly in a deep loam of a dry nature containing a fair proportion of lime. Any other class of soil, from heavy clay to light, sandy soil, however, is suitable for its cultivation, provided the natural and artificial drainage is deep and adequate. Stagnant water, either in the soil or on the surface, is fatal to the healthy

development of the plant. Of course, lucerne is not adapted for a place in the rotation. It does not obtain a thorough hold in the soil or attain its period of full productiveness for a few seasons, and consequently it is suitable only for land that can be let out of cultivation for a period of six to twelve years. The seed, at the rate of 15lb. to 20lb. per acre, may be sown with a cereal crop, but better results have been found to accrue from the practice of sowing the seed alone. It stands to reason that land intended for a crop that is to hold the ground for so long a period should be thoroughly cleared of weeds before the seed is sown, otherwise the plant will probably obtain a poor start, and the yielding powers of the crop be thereby irreparably impaired. The seed should not be sown until danger of frost is past, as the plants in their tender stages are very susceptible to injury from frost. Except on very rich soils no yield need be looked for the first season, which is occupied in root rather than herbage growth. If the growth should be considerable, however, it may be lightly pastured if not late in the season.

Apart from its convenient peculiarities of growth, lucerne possesses material advantages in the quantity and wholesomeness of the stock feed it yields. By the third year, and for so many years thereafter as the health of the roots and fertility of the land are maintained, the crop may be cut three or four times a year, yielding in all 4 or 5 tons of hay per acre. Perhaps the purpose for which this crop is best suited is for soiling, that is, cutting green and feeding to stock in the sheds. In this capacity no other crop surpasses it, or in a dry season nearly equals a well-managed field of lucerne. When used in its green state the forage is palatable, digestible and nutritious. The crop, however, is also capable of effective utilisation for pasturing and for the making of hay. In pasturing lucerne, as is the case with respect to many of the stronger growing grasses, the herbage must be prevented from attaining too rank a growth. Enough stock should be kept in the field to eat off all the growth before the plant passes the early blossoming stage, or if this is impracticable the field should be mown as often as the plants reach that stage of maturity. It is not deemed prudent to pasture lucerne with sheep, or even to compel cattle to eat it too closely. Close grazing is fraught with serious risk to the life of the plant. Pigs do well on it, and can inflict no harm.

Perhaps the chief point urged against lucerne in this country, and on account of which preference is given to that other very serviceable crop, sainfoin, is that it is incapable of being made into hay of high quality and palatability. This low estimate of the hay-making qualities of the plant appears to be widespread, for it was chiefly with the object of collecting refuting evidence that the pamphlet under notice was prepared. We may here state that this depreciatory opinion of lucerne as a hay crop is not unanimously endorsed in this country, for we know several experienced in the growth and utilisation of the crop that entertain quite the opposite idea of its value when saved as hay. The broad result of Mr. Harcourt's

investigations is to show that both estimates are correct according to the time and method of cutting and saving the crop. The great essential in the saving of this fodder is to cut early while the stems are still green and succulent. The difference between hay made from immature and ripened lucerne is very pronounced. If allowed to develop the flower before being cut the value and digestible properties of the fodder are vastly impaired. Elaborate investigations have elicited the fact that the crop yields its best quality hay if it is cut when the buds are formed and before the flower makes its appearance. The hay made at this stage is of prime quality and nutritive property. For the sake of increase of yield it may be considered advisable to defer the mowing operation beyond this stage however, but under no circumstances should the herbage be left on root until the flower is fully out. The latest stage of development at which the crop may be cut without permitting serious depreciation to the consuming quality of the fodder is when the blossom is one-third out. The hay at this time is not of the same rich quality as that from the earlier cutting, the percentages of ash and crude protein being reduced about 1·25 per cent. and 3·50 per cent. respectively by the delay. There is some compensating gain, however, in an increase of carbohydrates. From this stage, when the flower rather, than the foliage is vigorously developed, the rate of depreciation is very rapid, an average of three different crops having shown that the decrease in the digestible matter amounted in a couple of weeks to 18·8 per cent., or very nearly one-fifth of the total digestible matter.

Mr. Harcourt adduces evidence to prove that lucerne hay is very similar to that of the clovers, both in food and ash constituents, and that it is quite as digestible as red clover or timothy when cut at the proper stage of maturity. When cut at the time about one-third of the blossom is out, lucerne yields more digestible protein than either red clover or timothy, but he points out that there is a certain element of danger in feeding lucerne hay that has been made from the plant in advanced stages of maturity. Allusion is also made to the difficulty experienced in drying and saving green lucerne, owing to the amount of water in and thickness of the stems. Emphasis is laid upon the advisability of curing the crop, as far as possible, in the cock. As in the case with clovers, the leaves of lucerne are easily broken off when dry, and as these constitute the best part of the plant loss is very liable to result from exposure and much handling after it is dry and brittle.—*The Field.*

Broom Corn.

The following directions for the cultivation of Broom Corn appeared in the South Australian *Journal of Agriculture*:—

"The cultivation of this plant for commerce has barely begun among us. In all Australia last year there were only about 60 tons produced. It grows luxuriantly in meadow land, river flats, and reclaimed swamps, and also in sandy or loamy soils outside the influence of creek or river; but in the latter the fibre is shorter and finer. The yield of fibre is from 8cwt. to 15cwt. per acre, according to the class of country, and of seed about half a ton. A good price for the fibre is £25 a ton, and for seed £12. Last year a grower in Gippsland, Victoria, got £50 a ton for the fibre off seventy acres, and £12 a ton for some 40 tons of seed. The seed is rich food for stock, pigs, poultry, &c.

The following are directions for growing:—

1. The seed should be put in in early spring, and may be sown up to November in late districts.
2. The ground must be finely worked up and clean.
3. The seed is sown in drills 3 ft. apart, 4 in. deep and thick (*i.e.* from ½in. to 1in. in the drill), about 7lb. to 8lb. to the acre.
4. The drills should then be lightly rolled over.
5. As soon as the crop appears a scarifier should be run between the drills and close up to the plants.
6. When the plants are about 3 in. high the weaker plants should be thinned out by hand or hoe, so as to leave the plants about 3 in. or 4 in. apart.
7. When the plants are 6 in. high the drills should be hilled, all weeds being at the same time removed.
8. From this time until maturity the scarifier should be run through the rows when it is thought necessary. The broom takes from fourteen to seventeen weeks to mature.
9. When the seed is full but not quite ripe each stalk is cut with a knife about 6 in. below the fibre. When the fibre is short it is well to cut a longer stalk. It is found to be quite unnecessary to bend the heads some time before cutting, and is only a waste of labour.
10. The heads thus cut are then dried, either (1) by spreading them out in the open air, 3 in. or 4 in. deep, on a layer of broom stalks to keep them off the ground, and another layer of stalks on the top of them, or (2) by taking them at once into sheds away from risks of rain and setting them on racks, or in any other way drying them that may be found convenient and economical. The heaps should be turned occasionally during the process of drying. It is important to retain a pale green colour; it informs that the fibre is tough. Here beauty is the handmaid of utility.
11. When the fibre is dried the seed is removed by a simple machine, costing a few pounds, which can be worked by hand or horse power.

12. The fibre thus dried and cleansed is classified according to length, pressed in bales, and sent to market.

13. If the seed has been sown fairly early a second crop can always be taken. This second crop matures in about six weeks."

Agricultural Shows.

One more discussion respecting the most useful arrangement of agricultural country shows, as to whether numerous small shows or larger central ones were preferable, was lately held at the Inkerman branch of the South Australian Agricultural Bureau. The following paper was read by one of the members:—

"A great deal is often said and will continue to be said as to the advisableness or otherwise of holding so many small country shows. To some there seems to be no question whatever that there are far too many. Some would even say that the Government subsidy should be curtailed, and thus crush the small shows for the benefit of the larger ones. "Let us have few shows and good ones," some will tell us. This argument may sound all right from a theoretical point of view, but how will it come out in practice? Let us consider some of the effects that will assuredly accrue from such an alteration Because a man may be farming in a small way, or a person carrying on business in a small way, is no reason that they should not enjoy the same proportionate advantages as others who may be doing business in a much larger way. Are not both essential, as they are mostly regulated by what the surrounding locality will warrant? Then such an alteration will have a tendency towards centralisation, which is by no means desirable for the well-being of a country.

I do not, at present, attempt to discuss the point whether or not shows are a benefit. We take that for granted. The question is, should they be reduced in number and held in favourable centres?

Some time ago I noticed a paper that was read at the Naracoorte Branch of the Agricultural Bureau, in which the writer contended that there should be one large show in the South-East, to be held at different townships each year. In that case each place would require a show-ground to be fitted up at a very great cost—over £1,000—to be used once in about ten years. The writer also remarked that with the advent of federation, and the border barriers being a thing of the past, Victoria would, in all probability, be a large exhibitor. Is not such a system questionable? Instead of giving prizes to exhibits that would only be seen on show day, would it not be better to give it to the best that could be produced in the district?

One of the results of holding fewer shows in the country (say, half a dozen, as some suggest) would be that a few tip-top professional exhibits would be taken round to all the shows, as the prize money that would be offered at such a large show would be well worth

going for. So that, in all probability, a great many of the first prize exhibits in Adelaide would be taken round to all the shows, as that show is held before the majority of country ones; whereas under the present system, in most cases, the prizes go to local exhibits. Of course some make a practice now of following up the shows, but I think it would be increased under the proposed system.

It is quite impossible to raise exhibits in poor districts that could fairly compete with those grown in a more favourable locality. A person may have a really creditable exhibit for a dry district that would require as much brain and muscle to raise it as would be required to raise a far superior exhibit when conditions are more favourable.

Then let us look at it from a social point of view. Show day affords an opportunity for meeting friends. Many look forward to the show for a day's outing and for interchange of social feeling. If many of the shows were cut off, hundreds of people would not have an opporunity of seeing a show at all. I am quite aware that by advocating the continuation of small shows I am going against the opinion of a great many, amongst whom is Professor Lowrie; still, wise men are liable to err at times. One reform that is needed is that trials of agricultural implements should be insisted upon before awarding prizes. If show societies and the Bureau could be united I think much good would result, as the support given to each by the Government put together would do a great deal. One point where the societies lack is that very little is done from the holding of one show till the next, by way of practical experiments. This the Bureau could supply with the great advantages offered to its members. A misfortune that besets the societies is that they are run individually, and a spirit of antagonism exists instead of each regarding the other's interests. By being united dates could be fixed so that they could hold their shows in rotation instead of clashing with each other, as is frequently the case."

After brief discussion it was agreed that the present system of holding shows was preferable to reducing the number.—EDITOR.

STOCK FARMING.

Pig Keeping.

Although there are various systems of breeding and feeding pigs for profit, there are only two forms of practice which are common throughout the country, the first of which is more frequently found than the second. The majority of persons who keep pigs do so with

little or no knowledge of the subject—and with, we may almost say, systematic loss. The second class make a study of the industry, with the result that they make an equally systematic profit. It is a curious fact, but it is true, that there is a large class of individuals who believe that poultry and pig keeping can be profitably carried on by any person, without the slightest previous acquaintance with the work, and without any attempt to obtain practical information in relation to it. This is an entire mistake. The pig breeding and feeding industry is, no doubt, simple in comparison with many other industries, but it demands knowledge and experience, otherwise it cannot succeed.

WHAT PEOPLE DEPEND UPON.

Now, let us commence our reference to certain details in relation to pig keeping by remarking that profit depends absolutely and entirely upon a recognition in practice of the following points: The adaptability of the breeding sow, the need of a cross, the management of the breeding stock, and what we may term rational feeding. The practitioner finds—and we are not speaking of the pedigree breeder—that the best sow is one which is long in the body, broad in the loin and chest, deep from the back to the abdomen, large in the ham, and provided with tolerably long ears and snout. Such a pig may be as large as can be obtained, and it matters very little whether it is a half-bred, a quarter-bred, or a mongrel in which pure blood is just traceable, so long as it is not a mere waster upon which flesh cannot be put by good feeding. The animal should be, in addition, vigorous in the extreme, full of health, a determined feeder, and able when at liberty to forage well for herself.

The drift of these remarks is that such a pig will not only produce a large but a vigorous litter. We may obtain large litters from time to time from pedigree sows, but the breeder requires something more. He wants his pigs to live and to thrive, not in numbers too large for a sow to rear, but in numbers sufficiently large to pay him well for his trouble. With regard to the cross, the boar should be such as will impart quality to the offspring, assisting in the promotion of their growth, and in their rapid feeding into meat. Sows such as we have described do not always produce offspring which are quick feeders, but the point is not imperative so long as the cross is judicious. A sow which does breed quick-feeding pigs, mated to a boar of similar blood, may, and does in the case of some of the pure breeds, produce young which not only feed well, but become much too fat for the buyer, and this must be guarded against. With regard to the management of the breeding stock, we would point out that the adaptability of a sow to a specific purpose may be wholly or in part destroyed by close sty feeding. A sow should have liberty, inasmuch as exercise assists in the maintenance of health and vigour, without which prolific and hardy litters are next to impossible. The feeding of the sow, if in the sty or if partly in the sty, must be such that fatness will not be encouraged, and that con-

stitution will not be impaired, and this brings up to what we may term

RATIONAL FEEDING.

Now the object of breeding pigs is the production of pig meat—pork or bacon. Modern practice, like modern theory, teaches that early maturity is not only the most economical to the breeder, but most appreciated by the curer and the consumer. The meat is less fat if the breeding is right, as well as more tender. Whatever may be said of the practice still existing in Lincolnshire and other parts of the country of feeding old bacon, we are convinced that just as it has been throughout the country in general abandoned in favour of young meat, so does the feeder find that his profit is increased when he adopts the practice of maturing early instead of feeding late. It costs infinitely more to produce a pound of meat on an older pig than on a young pig, and thus the bigger the animal, and the longer it is fed, the greater the cost per pound of both live and carcase weight. Indeed, feeding may continue until meat is produced at an actual cost, until, indeed, an animal sells for a good deal less than it has cost to feed.

The object, then, in feeding for meat production—which is the great end in view—should be to rear the young pigs well while with the sow, by feeding her rationally and leaving her with no more than she can rear with justice, and subsequently forcing them on in order that they may be placed in the market fit for the butcher at the earliest possible moment. What can be done in this direction every man can see for himself, not only at the great summer breeding-stock exhibitions, but at the winter fat-stock shows. Here we are able to find young pigs of six months which are as heavy as the average fat pig of the country at twelve months or more. In this way the individual animal is not only worth more money per pound and per head, but the number of pigs fed—or, shall we say, turned over—per annum is precisely doubled.

BREEDING.

The methods of breeding and feeding pigs may be differentiated as follows: The common sow may be mated with the pure-bred boar for the production of young pigs or weaners for sale at weaning time; for the production of porkers for sale immediately they are fit for slaughter; and for the production of stores or fatting pigs of large size for sale. Next we have the mating of the pure-bred sow with the pure-bred boar of one variety for the production of breeding stock for sale; and, lastly, we have the practice of buying instead of breeding. There are some who buy weaners or young stores for conversion into bacon of larger size. In the first place, selling weaners is a practice which depends upon circumstances. The man who produces no milk, potatoes, or pig-food of any kind, but who is compelled to buy all his food when it is costly, may be obliged to sell whole litters at a time when they are taken from the sow, but

the man who produces skim milk, potatoes, offal corn, and other food, and who has a run of grass for his breeding stock, may be well advised to both breed and feed for porkers.

One of the most practical, if not the most economical methods as well, which can be adopted by the average pig keeper, is that of breeding and feeding for the pork market. The object here is precisely that which we have described in our opening remarks; the sow must be large, inasmuch as the size of the young pig is more influenced by the dam than by the sire, and young pigs must in their turn be large and rapid growers. But quality is also essential, and this follows the sire; by quality we mean, in this case, feeding power, or the capacity to convert food into good lean meat. The public refuse superabundant fat; they demand fairly lean hams, and as far as possible streaky bacon. There are strains of swine which, while growing rapidly, maintain a gaunt frame, badly clothed with meat, and remaining spare untill growth has advanced. This is precisely what the breeder should avoid; he must combine the two qualifications, rapid growth as far as size is concerned, and the concurrent power to put on flesh.

We have shown already how this end can be brought about. In practice it is admitted, but it is more generally ignored than not, and it is for this reason that so many men fail to make pig keeping pay. It is impossible to feed for a particular season or for a particular market, inasmuch as prices vary with seasons, and the breeder must, therefore, be prepared to take just what he can get when his pigs are ready. But if he makes a practice of producing animals of the right size, or what is called sizeable meat in the carcase, not too small for joints, and for the same reason not too large, with fat which, while present in sufficient quantity, is not excessive by the thickness of a wafer, he is certain to find a market at all times, and to obtain the best prices.

WEIGHT AND QUALITY.

With regard to both size and quality—or, to be more correct, weight and quality—the feeder, having selected the most convenient market, should make himself acquainted with precisely what the butcher or the dealer requires, and, having learnt this, he should proceed to act in accordance with it. He should never give them the excuse for making deductions, and should take care himself to see the carcase weighed if he is able to do so, or, failing that, to weigh always when the carcases are straight and firm, and, if possible, to have the weight verified by someone upon whom he can thoroughly rely in case of necessity.

Breeding for pure-bred or pedigree stock for sale is quite another matter. In this case it is necessary to obtain not only the best blood in existence, if that is possible, but to be an excellent judge of swine, and to obtain or acquire such a reputation as will result in sales at remunerative prices. We cannot but deprecate too many attempts in this direction on the part of persons who are not judges, and who

are not skilled, for the practice is followed in nineteen cases out of twenty by waste of money in purchase of stock, by a loss in breeding, aud by the diffusion or dispersion of a number of animals among equally unskilled individuals, which ought to hav gone to the butcher, instead of being employed in the reproduction of their species.

The practice of keeping pigs until they reach adult age for the purpose of producing large carcas s of meat is a practice which must also be deprecated, for the reasons which have already been advanced. We doubt very much whether any person can produce pork by this method so cheaply as he can buy it in the market. It is quite certain that where it is converted into bacon it costs more than it is worth, although there may be some satisfaction in a knowledge of the fact that it is home fed and home cured. Now with regard to

BREEDS.

Above all things the Small Black and the Small White must be avoided, they have nothing in common with economy. In many cases the Middle White boar may be employed for the purpose of imparting quality where large common sows are used, but this animal should be approximately large, not too thick in the collar and jowl, not too short in the ear, and not too much turned up in the nose. All things considered, the Large White is the most profitable animal, although there are occasionally to be found Middle Whites which gravitate both in size and form of head to the Large White. It will be found, as a general rule, that the shorter the head and nose, and the smaller the ear and the thicker the collar, the slower will be the growth and the greater the aptitude to put on fat. The Large Whites, the larger strains of Berkshires, and the red Tamworths, are excellent bacon pigs, but in feeding for porkers we should prefer to recommend, for the large long-bodied sows to which we have referred, boars of somewhat smaller size, slightly gravitating towards the character of the larger Middle Whites.

The thick short bodied and short-headed pedigree sow is to be avoided by the average breeder for market purposes, and for the simple reason, which will already have been defined, that large numbers of the pigs produced by these animals not only want vigour, but altogether fail in rapidity of growth, rather laying on fat during their early days than making size and weight. The feeder must not aim at too many pigs per litter, nor attempt to rear too many should they be produced. Strong litters should be well fed through the sow, fed with the sow later on, and pushed on with rapidity when placed in a sty by themselves.

J. Long in *The Dairy*.

Linseed for Calves.

COMMON FLAX PLANT (*Linum usitatissimum*, L.).

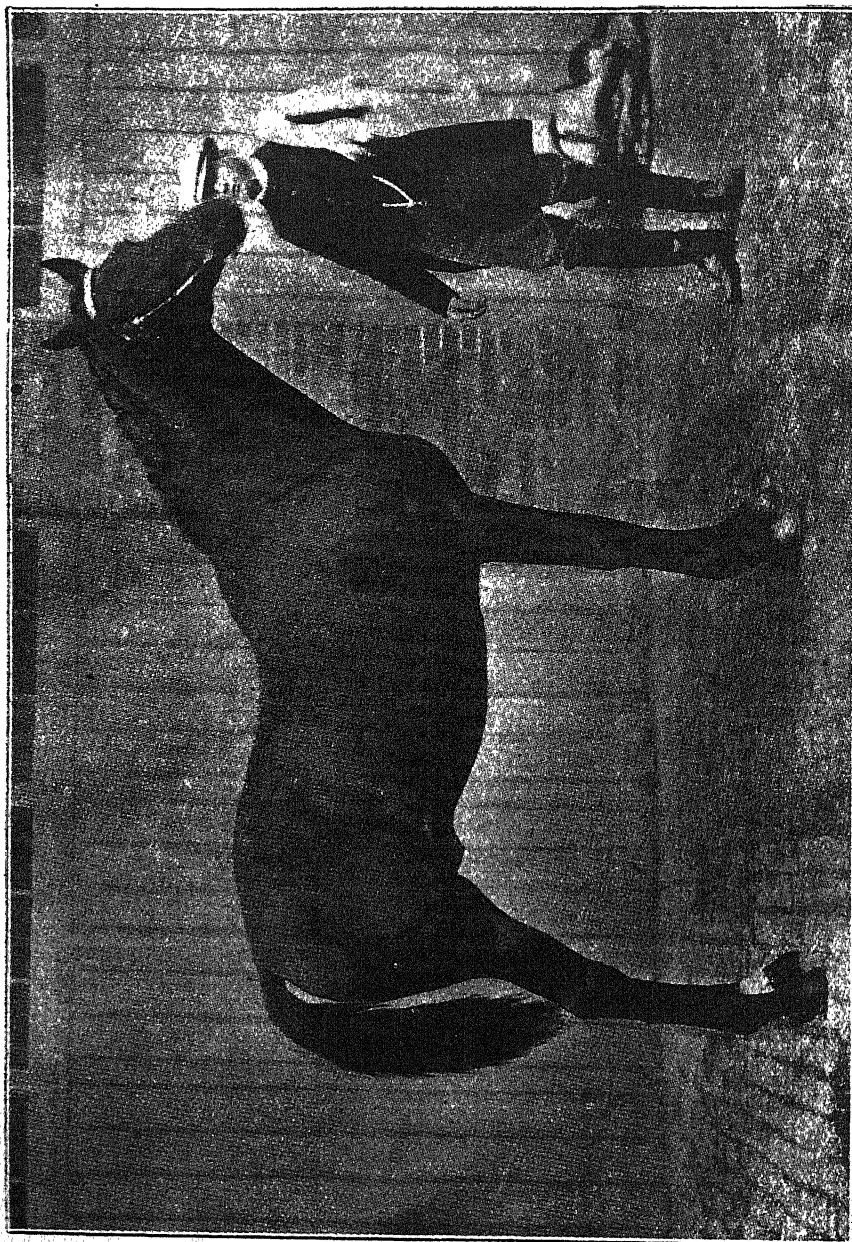
The success which has attended, as so generally reported, linseed fed with skim milk to calves and probable increase in its use, suggests the enquiry whether this article cannot be profitably home-grown for that purpose.

Flax is cultivated for two purposes, the seed for oil and oil-cake, while the fibre in the stalks constitutes the flax of commerce and manufactures.

The plant will grow well in a great variety of soils and climates, and will no doubt yield satisfactory returns in many parts of this country.

It is an annual plant and occupies the land from ten to twelve weeks. Sown in September it will be ripe in December.

The quantity of seed sown depends on the purpose for which the crop is grown, for if chiefly for the fibre a much larger quantity is sown per acre than if seed is the chief object of cultivation. As much as 120 lb. or more is sown in Belgium, as the stalks are intended to grow up singly, whereas where the fibre is no object, the plant is best when bushy and covered with seed pods. Forty pounds per acre would



THOROUGHBRED STALLION, IRISH WAKE.

be more than sufficient in this country, as we do not expect to utilise the fibre just yet. Some thirty years ago, or more, the late Mr. Joseph Wood cultivated linseed on his farm near Bathurst, and quite likely some of our other farmers have tried it, and we shall be glad to receive any colonial experiences on the subject, The best kind of seed for our purpose will be English, for though some other seeds, as the East Indian, contain a little more oil, the former is much richer in mucilage, which is specially useful in calf feeding as well as for oil. A good sample of English oil contains on analysis :—

Oil	34·76	per cent.
Organic compounds containing Nitrogen*	51·10	„
Albumen, etc.		„
Water	10·52	„
Ash	3·52	„
	100·06	„

*Percentage of Nitrogen, 4·38.

At this rate, or one-third its weight, a pound of good linseed will contain 5½ ounces of oil, and it is a curious fact that one gallon of average new milk contains about the same quantity of butter fat. We do not claim it is equal for the purpose of calf feeding, though experience has proved it to be one of our best substitutes.—Editor.

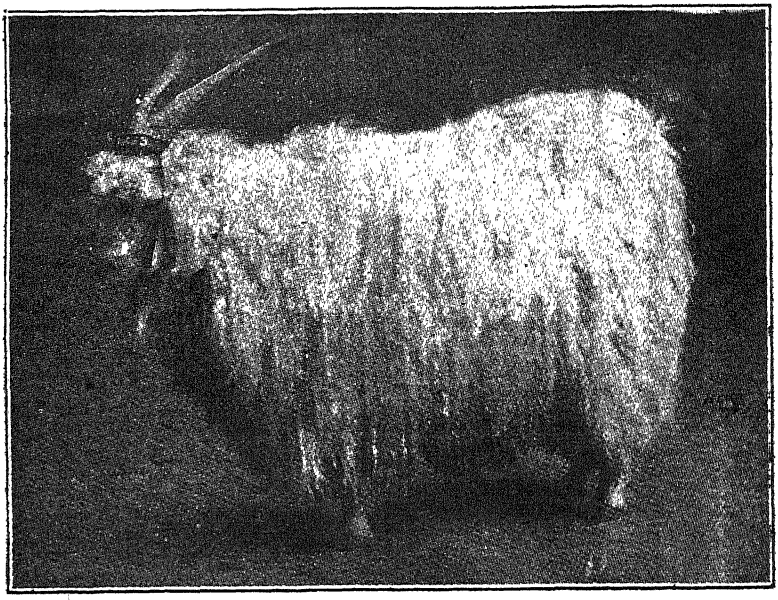
Thoroughbred Horses.

For the following short notice and accompanying illustration we are indebted to the *Live Stock Journal*:—

"The thoroughbred stallion Irish Wake is a bay, 15 h. 3½ in., foaled in 1890, bred at the Yardly stud, and owned by Mr. Thomas Child Grantham, Capons Farm, Cowfold, Sussex. His sire was Master Kildare, dam Festival by Sterling, granddam Traviata by Stockwell. At the London Show of the Royal Commission on Horse Breeding he was awarded one of the Queen's Premiums in District Class D for Berkshire, Cornwall, Devonshire, &c. He is a well-shaped and handsome stallion, with plenty of bone, good crest, and is of quite the hunter type."

This hunter type of thoroughbred furnishes the stallions said to be most suitable for mating with suitable mares of other breeds for securing cavalry chargers and other horses required for military purposes.—Editor.

American Angoras.



AMERICAN BRED CHAMPION ANGORA BUCK, LAZARUS.

Champion first all over at Kansas City Angora Show, bred and shown by Mr. D. C. Taylor and sold by auction October 16th to Col. Richardson of Dubuque for $700 (£146 16s. 8d.), which the *American Sheep Breeder* states is the record price for an American bred Angora, and that Lazarus won on kemp (which we understand means freedom from it), fibre, and weight of fleece. Respecting the last point, we notice in the *Sheep Breeder* reference is made to the all-importance of fineness or quality, and no doubt great care is ever necessary to be exercised by Angora breeders that fineness of fibre must not be sacrificed in securing increase of weight. —EDITOR.

Dishorning Calves.

The practice of dishorning calves is steadily gaining ground from year to year, with the result that the number of polled stores now to be met with in our markets is becoming larger and larger every season. This is as it should be, because experience shows that polled cattle thrive better when fed in yards than others of the same breed and of similar age with their horns left untouched. Another point in favour of dishorning is that when cattle are so

treated it is found possible to keep a larger number of them in the same space than if the animals were left in their natural condition. Many farmers still follow the practice of allowing their calves to produce their horns in the natural course, and removing these horns only when the animals are to be put up for feeding or sent for sale to some market where it is known that polled cattle sell better than those with horns. Much better than this plan (which causes considerable pain to the beasts while the horns are being cut off) is that so frequently advocated in these columns during the past ten years—the application of a little caustic potash to the embryo horn roots within a week or ten days of the animal's birth. This plan is simplicity itself. All that is necessary to do this is to purchase at the nearest chemist's a stick of caustic potash and a little common ammonia; a pinch of the ammonia should be put into a little tepid water, and with the water thus ammoniated, the skin immediately over the region of the horn—to the size of about half a crown—should be thoroughly "soaked." Care should be taken not to allow the area so moistened to exceed the size of the horn base. The circular patch thus treated should then be rubbed with the free end of the caustic potash stick (the other end being covered with paper to protect the fingers of the operator), and the process should be continued for a few minutes, or until the skin over the region of the horn begins to redden or become raw. The operation is then complete; the part operated on shortly becomes "crusted" over; this crust peels off in due course, and the "horn root" being thus destroyed there need be no fear of its subsequent growth. In order to ensure the success of the operation the caustic should be used before the calf is a fortnight old.—*Canterbury Association's Journal, N.Z.*

VETERINARY.

Lung-Sickness of Cattle; Contagious Pleuro-Pneumonia, or Pleuro-Pneumonia-Bovum-Contagiosa.

(*Continued from Page* 210.)

The Starting Point, and Sequence, of the Lesions in the Lung Substance.—This is a point on which there is considerable difference of opinion amongst microscopists. Dr. Yeo is of opinion that the disease commences in the smaller bronchi by irritation of the mucous membrane by the specific micro-organisms. This leads to chronic ulcerative bronchitis; occlusion of the affected air tubes; lobular

pneumonia; a thickening and infiltration of the walls of the air tubes with the products of chronic inflammation, &c. Dr. Woodhead* has arrived at somewhat different conclusions from Dr. Yeo. He says: "It appears probable that in the case of pleuro-pneumonia the organism is taken into the lungs by inhalation (as a matter of fact all cows cannot be made to take the disease experimentally), and it is quite possible that some antecedent bronchitic change is necessary. From analogy it may be argued that this material passes into the air vesicles, and sets up only slight catarrhal change, if any change at all. From the vesicles (and in some cases say also from the minute bronchi) the organism finds its way into the lymph spaces in the wall of these vesicles, and there commences to multiply. From either of these positions the virus may be followed by its effects."

As will be observed from my remarks in explaining the effects of *drenching*, I am led to agree with the view expressed by Dr. Woodhead, and also with the additional remark made on the same subject by McFadyean. He says wherever the initial lesion is "There is clear evidence, in nearly every case of the disease, that the affection spreads by way of the lymphatic vessels and spaces of the interlobular connective tissue (including the peri-bronchial and perivascular lymphatics), and that the implication of the bronchial and alveolar epithelium is purely a secondary process. In all cases the primary and essential change is a distention of the lymphatic vessels and spaces of the part with fibrinous lymph that is comparatively poor in cellular elements. Indeed, in a great measure, the lesions when fully established appear more of a lymphatic engorgement than an inflammation, but doubtless this engorgement is associated with a truly inflammatory process at some points of the lymphatic system of the parts."

Method of Selecting the Virus and Inoculating.—Great care should be exercised in selecting the virus; no blood-coloured virus should be taken. The best way to avoid this is—after having killed and bled the animal, and removed the whole lung from the thorax carefully—to let the lung lie in a shaded cool place for an hour or more, so that the blood may have time to coagulate. Then disinfect the surface of the lung, and with a sharp-pointed knife carefully make an incision along the white bands of interlobular tissue, converting them into a sort of open drains; the serous fluid, or lymph, will then gravitate into these, and enable you to bale it out with a narrow teaspoon or eggspoon, or suck it up with a sterilized syringe. In the more recently affected portion of the lung, the spaces between the interlobular tissue lines present a pinkish yellow colour, and its cells are filled with a clear serous fluid. It is from this newly affected portion that the best virus is obtained. For convenience, the virus should be placed into small wide-mouthed bottles—from two to four ounces—previously sterilized, and to preserve the virus, one fluid drachm of pure glycerine should be added to every ounce of virus.

* Journal of Comparative Pathology and Therapeutics, Vol. I.

But although the virus can be preserved for a considerable time in this manner, it is better to use it within a week after it has been collected, and it should not be used much after two weeks, however well it may have been preserved.

For inoculating, the instruments required are an inoculating needle, a pair of ordinary sharp scissors to clip off the hair from the part, a docking iron for searing the end of the tail when a portion has to be amputated, and some woollen thread, such as Berlin wool or Scotch fingering. The woollen thread should be cut into four-inch lengths, and placed in the open-mouthed bottles; in this manner several hundred threads can be saturated in two to four ounces of virus.

The inoculation needle is about four inches long with an eyelet near the point, its base being inserted into a convenient handle. These needles can be obtained from Messrs. Mayer & Meltzer, Surgical Instrument Makers, Cape Town.

In securing cattle for inoculation, trained transport oxen may be caught and fastened by the horns to one or two wagons placed lengthwise in front of each other, the oxen being packed together as close as possible. Cows and other tame cattle can be caught by a riem, after which a man at each horn can hold the head, while another fastens a rope or riem round the hind legs to hold them firm. This protects the operator, while it prevents the animal from jumping about. Semi-wild animals must be cast.

In thus preparing the way for the operator, great care should be exercised not to harass, heat, or bruise the animals in any way, and on no account should any animal be caught by the tail when being thrown. Any such injury is liable to induce swelling at the part when the virus is circulating in the blood.

Having secured the animal, the operator proceeds to clip off the hair from the brush for about two inches upwards from the point of the tail on the upper side. The part should then be cleaned and disinfected with a brush and suitable fluid. To facilitate matters this should be done by an assistant. The operator then holds the tail firm by the brush with his left hand, while with the right he carefully passes the needle up under the skin in a straight line for an inch and a half, passing the point of the needle out by gentle pressure on the handle. One saturated thread is then put through the eye of the needle and drawn till both ends are even. The operator now retracts the needle, drawing the thread into the channel after it, meanwhile gently compressing the lower orifice with the thumb of his left hand to retain the virus. When the point of the needle is clear, the thread is clipped off close to the needle, thus leaving the main portion in the channel. In this manner, with plenty of assistance, one inoculator can inoculate from three to four hundred in a day.

During recent years, more particularly in the Australian Colonies, the needle and thread have been largely replaced by the hypodermic syringe for inoculating cattle as a preventive of the contagious lung-

sickness in cattle. The method adopted is similar to that now so largely practised in inoculating cattle against Quarter-Evil. The hair is clipped from the upper surface of the tail for about six inches extending from the tip. The part is then cleaned and disinfected with a five per cent. solution of carbolic acid or Jeyes' fluid applied with a brush. Then insert the hypodermic needle under the skin, and carefully pass it up between the skin and subcutaneous tissues for about two and a half inches, move the needle a little from side to side so as to enlarge the channel at the upper end, then withdraw it a little, attach the syringe to the needle, and inject the virus—about 6 drops—then withdraw the needle and syringe together; at the same time, with the thumb of the left hand, close the puncture in the skin, and gently rub the swelling containing the virus so as to spread it out in the cellular tissue. In Australia they have hypodermic syringes which regulate the dose from a well which is attached, and the operator simply injects the dose under the skin without any preparation of the part.

In this manner large herds of cattle can be inoculated very rapidly. It is claimed for this method that it is simpler and more uniformly effective, and less liable to septic swellings than the old plan, which of necessity leaves an open wound.

The After Treatment of Inoculated Cattle.—Close attention should be given to inoculated cattle from the fifth day onwards. After this the cattle should be regularly kraaled, and particular attention should be given to the animals when they rise in the morning to see if they manifest any stiffness or inability to lift their tails. Any such symptom should lead to the animal being caught and its tail examined at once.

By the tenth day the inoculation should have *taken* in a considerable portion of the cattle. This *taking* is manifested by a slight swelling at the seat of inoculation, with a heavy exudation from the surface of the skin, but the size of the swelling has little or no influence on the effects produced. A pock is expected by many, but this is not usual, nor is it necessary. The swelling, if left alone, has a great tendency to extend up the lymphatics of the tail to its base, often involving the tissues of the hind quarters and the organs of the pelvic cavity. When the exudation extends up the tail, one of the first indications is swelling of the lymphatic glands or "kernels" on each side of the root of the tail. Many farmers cut these glands out—I have frequently done it myself—and when the operation is performed before the exudation has extended to the surrounding tissue, it is a very effective means of preventing the further extension of the swelling. "But the swelling of the glands is secondary to the irritation, swelling and death of the tissues at the point of the tail. Hence by amputating the tail upwards from the tip until healthy tissue is reached, there is no necessity for touching the glands until they show indications of containing pus, when they should be freely opened and dressed with the following mixture:—

Linseed oil	... ...	1½ pints
Turpentine	... ...	4 ounces
Carbolic acid	... ...	2 ounces

to be applied daily over the whole of the inflamed and swollen surface. In addition to this external dressing, one tablespoonful of sulphur should be administered to each affected animal daily. In the course of a week the swelling will gradually subside" (Soga). It is therefore important to observe that as soon as a swelling appears at the seat of inoculation, and from the swelling there exudes a yellowish serous fluid similar to the virus introduced, do not hesitate but amputate above the swelling at once, and see that the tail bleeds freely. The bleeding may be stopped by a ligature, but it is more satisfactory to use a hot iron—a docking iron is the best—and sear the wound. This prevents septic poisoning, and secondary swellings which are apt to follow, more especially when there are a number of swollen tails in a herd. To prevent this, it is also advisable to remove every animal with a badly swollen tail from the herd.

"*Does Inoculation introduce Lung-sickness into a Herd of Healthy Cattle?*"—The large majority of experienced Colonial farmers are fully convinced that the disease does occasionally appear in a clean herd of cattle after inoculation when there is no other source of infection known.

Admitting that such infection does occur; the question arises, How is the disease introduced? Do inoculated cattle communicate the disease to healthy susceptible cattle with which they come into immediate contact? The opinions of Colonial farmers are somewhat divided on this point, but the general opinion of European experts, arrived at by close observation and experience, is, that healthy cattle inoculated in the tail, in the usual manner, do not communicate the infection to healthy susceptible cattle with which they mingle, and the somewhat extensive experience of our own Veterinary Staff supports this view.

Is it possible, then, to communicate lung-sickness to healthy cattle direct by inoculation at the tail? The large majority of European experts express a confident opinion that you cannot, and when the disease does appear in an apparently clean herd, after inoculation, they assert that the infected animals must have contracted the infection previous to their inoculation, or before the inoculation has had sufficient time to confer immunity on them. Of course it is impossible to prove the contrary, more especially as inoculation against lung-sickness is usually resorted to only when the disease has already appeared in the herd itself, or amongst some herds in the near neighbourhood.

But from the numerous instances in which I have observed the disease to follow inoculation, when no other reasonable explanation could be offered except that of direct communication by the inoculation (*vide* my Annual Report for 1887 and *Agricultural Journal*, vol. v., p. 231), I am thoroughly convinced that inoculation is capable of communicating lung-sickness direct to a healthy susceptible animal.

I am quite ready to admit that such cases are comparatively rare; but that they do occur, and are the means of introducing the disease into a previously healthy herd, I entertain no doubt whatever: and it does not appear so improbable that such cases should arise under special circumstances.

It is a well-established fact that if an ox which has been inoculated or drenched as a preventive of lung-sickness, is operated on, or receives any external injury, during the time that the specific virus is circulating in the blood, specific local swellings are liable to occur at the seat of injury, and often assume serious proportions, proving fatal in many cases. May not the same local manifestation of the disease occur in the lungs through the accidental rupture of a small blood vessel, or local injury to the lung-tissue, thus permitting the organisms of the disease to escape into the inter-lobular tissue?

I observe that MM. Nocard, Roux and Dugardin-Beaumetz (*vide Veterinarian* Jan. 1900) state "that they failed to produce the lesions of pleuro-pneumonia in the lungs, whether the virulent lymph has been injected into the trachea, sprayed or blown into the trachea, after drying and pulverizing, or even injected directly into the lung parenchyma, or given by the digestive tract, etc.," but Professor Nocard adds: "I do not dare, however, to conclude from this isolated experiment that intra-pulmonary injection will always be without risk." I should think not, and judging by our experience I am surprised it is not always followed by serious results.

The Cultivation of Pleuro-pneumonia Lymph in Young Calves.—Pasteur's assistants—Dr. Germont and M. Loir—carried out a series of carefully conducted experiments for the Queensland Government in 1888-89, with the object of discovering an improved method of inoculation against the contagious pleuro-pueumonia of cattle; and amongst many interesting facts which they elucidated, they proved "that the virus taken from the lung of an animal suffering from pleuro-pueumonia and inoculated behind the shoulder of a calf from five to six months old produces a large œdema, and that the liquid or lymph taken from this œdema has always proved virulent, and that it maintains its virulence after three successive transmissions through calves, but in order to preserve this virulence it is necessary from time to time to rejuvenate the virus by a return to a case of spontaneous pleuro-pueumonia.

The calves destined to furnish the virus should be inoculated in the neck or behind the shoulder, the latter by preference, by the hypodermic injection of about 15 drops of virus obtained from the lung or pleura of an affected animal.

After from five to ten days, or sometimes a little later, a slight swelling is observed, which increases during the following days, both in thickness and in width. This swelling is painful when pressed, and as it expands the temperature of the animal becomes progressively higher, varying from 105° to 107° Fah.

At the end of one or two weeks the swelling ends by covering the whole of the abdomen; extending sometimes from the groin to the

neck. Generally, however, it remains limited to the side of the body on which the inoculation was performed; occasionally the exudation spreads into the thoracic cavity.

The animals do not always succumb to the consequences of inoculation, the chances of survival are all the greater the older the animals.

The death of the calves may be awaited, or they may be slaughtered in the full evolution of the disease, when the œdema is sufficiently large for practical purposes. Before opening the tumour to collect the virus, it is necessary first to break down, with a few smart strokes with a hammer or wooden mallet, the meshes of the connective tissue in which the lymph is imprisoned; this facilitates the collec ion of the virus, and has moreover the advantage of mixing the lymph with the solid particles which appear to contain the active portions of the virus.

To collect the virus the body is placed on the healthy side, and an incision is made along the whole extent of the tumour, and the skin is raised in such a manner as to form a pocket, in which the liquid will collect and from which it can easily be extracted. The meshes of the connective tissue may be further lacerated with the knife, if necessary, to free the virus. When the lymph is being collected in this way it is a transparent limpid fluid, but after a short time the fibrine coagulates and forms a clot; it is necessary to inoculate some of this solid matter.

All the operations must be carried out with the utmost cleanliness and antiseptic precautions, the hands and instruments must be disinfected, and the vessels for receiving the virus properly sterilized. When the virus is to be kept, an antiseptic, such as glycerine and a small percentage of carbolic acid, is added to preserve it.

It is on these lines that the inoculating lymph sent out from the Grahamstown Laboratory is prepared.

Drenchings.—With respect to drenching—that is, the administration by the mouth of a certain quantity of the fluid found in the thorax—as a preventive of lung-sickness, the experiments conducted by the Veterinary staff, in addition to the previous practical experience of hundreds of colonists, have clearly shown that drenching is an effective preventive against an attack of the contagious lung-sickness of cattle, when properly carried out. It is also comparatively free from danger, if proper precautions are taken, and due care exercised in administering the fluid. The following are the points which should be carefully attended to:—

(*a*.) The fluid found in the chest of an affected beast should alone be used for drenching, and it should be used pure after being strained,—no water should be added to it, but the mouth of the beast may with advantage be washed out with clean water after the dose has boen administered. This is merely to clean the mouth and prevent local inoculation should there be any abrasion of the lining of the mouth. Some place a tablespoonful of common salt in the beast's mouth immediately after administering the dose of *lung-water*

to clean the mouth, and it is an excellent plan. I have used it largely myself.

Experiment has proved that large doses of the *lung-water* may be administered with safety, but I would recommend for full grown beasts about ten fluid ounces, or a large breakfastcupful. Less for younger animals in proportion to age.

(*b*.) The practice of taking the diseased lung, mashing it up, and then mixing it with a quantity of water and using this mixture as a drench is not to be commended, because, as a rule, an affected beast, the *lung-water* of which is to be used for drenching, is invariably allowed to live until nearly the climax of the disease, in order to get as much fluid out of the chest for drenching purposes as possible. That being so, the affected lungs are full, not of specific lymph, but of other degenerated diseased products, and consequently the mixture made with these products and water exercises very little specific effect on the system, and cannot therefore be depended upon to act as a preventive against an attack of lung-sickness—but it is very liable to produce blood poisoning.

(*c*.) In administering the fluid, every care must be exercised to prevent any injury being inflicted on the mouth either by the finger nails or the bottle used for giving the drench. The least abrasion of the mucous membrane lining the mouth, or covering the tongue, is liable to lead to local inoculation, which generally terminates fatally. For the same reason cattle, which feed on rough and thorny veld, or have access to prickly pear, should not be drenched, as they are liable to have slight sores in the mouth, which are likely to lead to local inoculation. Even in the ordinary Karroo veld it is always advisable to collect the cattle, and keep them from grazing for about twenty-four hours before drenching them, so that any slight abrasions may have time to heal before the cattle are drenched. Cattle which graze on grass or bush veld are, as a rule, pretty free from such abrasions of the mouth. Operations such as castration, earmarking, and the like, should not be performed on young cattle that have just been drenched, as specific swellings are liable to appear at the seat of operation, and even at the seat of an injury of any kind.

With respect to the manner in which drenching with the fluid found in the pleural cavity gives an immunity to the animals, it is a very well-attested fact, that the characteristic exudation found in the lungs of affected animals can be produced by inoculation into any part of the body—externally or internally—wherever the specific virus enters the connective tissue. For example, if a beast is inoculated subcutaneously about the chest or dew-lap, after the usual interval, the characteristic exudation will rapidly form in the connective tissue of the part, and extend along the lymphatics until, in some instances, I have seen it enter through the anterior opening of the thorax, and involve a considerable portion of the lungs before the animal succumbed.

In like manner, when the animal is inoculated in the tail, and the swelling and exudation extend up the lymphatics, and enter the

pelvic and abdominal cavities, the whole of the organs and tissues situated in these organs are frequently found saturated with the characteristic exudation of pleuro-pneumonia.

Likewise, when an animal is drenched with the "lung-water," as it is called, and there happens to be any abrasion of the mucous membrane of the mouth or throat, etc., local inoculation is certain to take place, and the animal invariably dies from the effects of the extensive local exudation which follows.

Further, I have seen the characteristic exudation occur in the abdominal organs after the animal has been drenched, the whole of the abdominal organs being glued together by an exudation exactly similar to that seen in the lungs of an affected animal; while the abdominal cavity was filled with fluid indistinguishable from that found in the thoracic cavity in an ordinary case of the disease. In such cases the inoculation of the abdominal organs must have taken place through some abrasion of a certain portion of the mucous membrane of the bowels. But so long as the epithelial covering of the mucous membrane lining the digestive track remains whole and sound, no local inoculation can take place, and large quantities of the lung fluid may be administered to an animal with perfect safety. But although a healthy and sound mucous membrane appears to effectually prevent the active germs of the virus of contagious pleuro-pneumonia from entering the mucous and submucous tisues of the bowels, and there producing their characteristic local effects, it is very evident that the product of these germs, or their toxin, does gain an entrance to the circulation, and produces its specific effects on the system of the animal, giving it an immunity from the disease, although there is no local manifestation of diseased action. It would apear that intravenous injection of the virus gives the animal operated on an immunity from the disease in a similar manner.

It is interesting to note in this connection that although the active organisms of pleuro-pueumonia fail to penetrate the healthy epithelium of the mucous membrane of the digestive canal, it is through the more delicate epithelium which lines the air cells of the lungs that ordinary infection takes place. But even in the lungs, it would appear that the germs of the disease gain an entrance only at certain points or centres, and the diseased action extends from these centres until the whole lung may become involved, so that even in the lungs the germs may enter only where there is a breach in the epithelium. It is further to be noted that in the large majority of cases the disease is confined to one lung, the other remaining unaffected excepting in the later stages, when it may become affected by an extension of the disease from the primarily affected lung. Both lungs are often affected, however, from distinct centres.

The Mode of Infection, or the Manner in which a Healthy Susceptible Animal Contracts Pleuro-pneumonia.—All investigators and observers are agreed that the principal manner in which a susceptible

animal contracts the disease is by coming near enough to a living affected animal to inhale the germs of the disease as they are expired from the lungs of the latter. The only difference of opinion is as to whether the disease can be contracted in any other way. Many observers maintain that it may be contracted from infected buildings, kraals, or pastures, from the manure of sick animals or from the clothes of the attendants, and also from the carcases of animals which have died of the disease. There is, however, no direct experimental evidence that the disease can be contracted in any other manner than by inhaling the germs direct from a living affected animal.

It is quite true that the lymph obtained from the lungs of an affected animal may be preserved for months, and Laguerrière proved by inoculation that portions of an affected lung retained their infectiousness for more than a year when kept at a temperature from 4° to 6° below zero. On the other hand it is a well-recognised fact that healthy uninoculated cattle may mix freely with inoculated cattle, even when extensive swellings follow the operation, and yet they invariably escape infection, if there are no diseased animals in the herd. Further, the experiment has frequently been made of placing the diseased lungs of newly slaughtered cattle in the feeding troughs of healthy cattle, but the results have always been negative.

It would appear, therefore, that although the micro-organism of pleuro-pneumonia possesses considerable vitality, and is capable, after many months, of producing the characteristic swellings when inoculated into any part of the connective issue of a susceptible animal, there is no direct evidence to show that the infective material preserved in any such manner is capable of gaining an entrance into the lungs of susceptible cattle in the ordinary way, and of giving rise to the disease. In expressing this opinion, my object is more to direct attention to the supreme importance of leaving no tainted animal in the herd, rather than to minimise the danger of infection from any other source.

What is the Best Method Practicable of Eradicating Pleuro-pneumonia from our Herds of Cattle?—There can be little doubt that the quickest and surest method of eradicating pleuro-pneumonia from our herds in this Colony, and in South Africa generally, would be to slaughter not alone the affected animals, but all the cattle that had been in contact with them, as was so successfully carried out in the case of the contagious form of pleuro-pneumonia which was introduced amongst our Angora goat flocks. But the pleuro-pneumonia of cattle is so widely prevalent amongst the cattle in our Native Territories, and there are various other reasons why such a measure could not be successfully carried out, that it need not be further considered.

The only alternative measure that offers any reasonable hope of success is the immediate and strict quarantine of all infected herds, and the prompt isolation of all infected animals in such herds, followed by their compulsory slaughter. It would be necessary also

to insist upon either the inoculation or drenching of the whole of the herd amongst which the disease appeared. There is no longer any doubt respecting the efficiency of either inoculation or drenching as a preventive of the contagious lung-sickness of cattle, when the operations are properly carried out. I am well aware that many careful and closely observant cattle farmers have been successful in arresting the spread of lung-sickness among their cattle by the prompt slaughter of the affected animals as soon as the slightest symptoms of the disease could be detected. But unless the disease is recognized early, the loss entailed in carrying out this method is sometimes very heavy, and the owner often hesitates when valuable animals become affected. For this reason, I am in favour of inoculation being resorted to immediately after the disease is detected.

The chief drawback to drenching as a practical measure for the early arrest of the disease is the impossibility of obtaining sufficient fluid to drench a large herd until a number of animals have not only become affected, but reached the last stage of the disease. But whether inoculation or drenching is practised, it is equally necessary to success that no infection be left in the herd, and that can only be secured by killing every animal which becomes affected. I do not mean to infer that every animal which recovers from an attack of lung-sickness remains a source of infection for many months and maybe for years, but it is a fact that many cases do, and curiously enough it is the mildest cases which are the most dangerous.

As already remarked, the extent of lung tissue involved by the lesions of pleuro-pneumonia, in fatal cases, is very variable; the whole of one lung or the greater portion of both may be affected. In the latter cases the only limit to the extension of the disease would appear to be the amount of healthy lung tissue necessary for the continuance of life. In the large majority of those cases which recover, however, the disease is confined to one lung, and if the whole of this lung becomes involved—which it does frequently—the consolidated lobules rarely regain their normal condition after the absorption of the exudate; the general tendency is to degeneration, and death of the lung tissue along with the exudate, and the gradual absorption of these degenerated products by the blood vessels and lymphatics, and their elimination by the ordinary excretory channels. All that remains in such cases, after complete recovery, is a mere shapeless shred of lung tissue firmly attached to the ribs by bands of fibrous tissue, while the unaffected lung is perfectly healthy and greatly increased in size. Such an animal would not be likely to convey infection to a herd after recovery is complete. There are many other cases in which a considerable portion, but not the whole, of one lung is involved in the diseased action. This diseased portion degenerates, dies, and is absorbed and eliminated in the same manner as the other, leaving a considerable portion of healthy lung, rather irregular in shape, with cicatrices or scars, indicating where the healthy lung tissue had come together and united after the removal of the intervening dead

portion, and the whole of this irregularly shaped healthy portion of lung is usually attached to the ribs with a variable number of small bands of fibrous tissue. There is no reason to believe that such cases would be capable of conveying infection to healthy susceptible cattle after recovery. It will be readily understood, however, that the appearance presented by the diseased lung in pleuro-pneumonia, even in cases analogous to the above, vary greatly, depending on the interval after recovery that the *post-mortem* examination is made, and even when the examination is made many months after recovery is apparently complete, there are numerous cases in which the diseased and degenerated tissue is not wholly removed, old abscesses containing degenerated products in a semi-fluid condition are met with. But these abscesses and cysts are usually so completely separated by their surrounding membranes from the healthy lung tissue, that I do not think it likely that the lungs so affected would be capable of giving out infection. But apart from these somewhat doubtful cases, there are many mild or abortive cases in which the progress of the disease in the lungs is very slow, and appears to be arrested in its course after involving but a limited portion of one or both lungs. This diseased portion instead of undergoing a rapid process of degeneration, and ultimate removal from the lung, the disease appears to assume a chronic form, and the tissues undergo a process of low organisation, more especially around the borders of the diseased portion. In such cases the disease is apt to revive in the affected lung at an indefinite period after apparent recovery, and such animals are capable of conveying infection to any susceptible cattle with which they come into close contact. These are the cases which are represented as having contracted the disease a second time, but it would be more correct perhaps to say that the diseased action had never completely ceased in the affected lung. At any rate, there can be no doubt that such mild and chronic cases are capable of conveying infection for many months and even years after their apparent recovery, and as it is practically impossible by an examination made during the life of the recovered animals to distinguish between those which are entirely free from infection and those which are not, the only safe course to adopt is to kill every animal which manifests the slightest indications of being affected, and thus free the herd from further danger from within.

But it would be practically impossible to carry out such a measure of slaughter thoroughly without the cordial co-operation of the cattle owners of the Colony. In the first place, unless reasonable compensation were granted owners would not promptly report outbreaks of the disease, but would try to conceal it as much as possible; and in the second place, the Stock Boards, composed as they are of farmers, would not enforce the immediate slaughter of affected animals, more especially the mild cases, which, as I have pointed out, are the most dangerous.

If cattle owners were, however, certain of obtaining fair compensation for all affected cattle compulsorily slaughtered, on condition

only that they reported every outbreak of pleuro-pneumonia as soon as it was observed, and on the other hand they were made liable to a severe fine if they failed to do so, and in addition ran the risk of losing the compensation which they would otherwise have been entitled to, owners would have every inducement to report an outbreak of the disease among their cattle immediately it was observed; and as a further inducement to carry out effective inoculation, I would recommend fair compensation for the loss of any animals which die from the effects of the operation. The expense to the public revenue would not be great if these measures were carried out promptly; in fact they would be very little in comparison to the loss annually sustained by the ravages of the disease.

D. HUTCHEON, C.V.S.

The Rate of Growth in the Horse.

We take the following extracts from Professor Cossar Ewart's instructive contribution on the above subject which appears in the *Live Stock Journal Almanac* for 1901:—

"Some years ago certain naturalists were wont to maintain that plants and animals had reached their present stage of development through the operation of internal (innate) forces. Now, however, the belief is all but universal that organisms are what they are to-day because of the operation of external forces—that they have reached their present stage through the ever-present influence from generation to generation of the external surroundings or environment. If during the past the environment (which includes not only the food, temperature, and other like influences, but also the influence living things have on each other) has been the means of producing so marvellous results—of not only causing variation but also of playing the part of the selector—it may be safely assumed that changes in the external conditions may even in a single lifetime lead to very decided modifications—not necessarily of a permanent (hereditary) kind—in, say, the size and fitness, the time at which maturity is reached, and more especially in the germ cells from which the next generation springs.

That in the case of the horse the external conditions or environment count for something, a glance at the history of the *Equidæ* affords sufficient evidence. In early Eocene times the representatives of recent horses were small-brained, primitive, five-hoofed creatures, about the size of a wolf, but at the most semi-plantigrade. As age succeeded age the outer digits (1 and 5) gradually dwindled, and at length Hipparion appeared on the scene a creature decidedly equine in form, and only essentially differing from the horse of to-day in its teeth and in its limbs, each limb bearing three complete hoofs, as in the rhinoceros.

At a still later period the evolution of the horse was carried a stage further by the shrinking within the skin of the second and fourth digits, already quite useless in Hipparion and in the three-toed horse (Protohippus) of the New World.

Like Hipparion (many fossils of which have been unearthed near Athens), the true horse, during at least the Reindeer period in Europe, was of a considerable size. This conclusion is supported by the size of the petrified remains in the Rhone valley, where for a time the horse afforded abundant sport for Palæolithic man. Just as in olden times the elephant in certain areas dwindled in size to form pigmies measuring sometimes only 36 in., so the horse gradually dwindled to form certain pigmy breeds which (as in the Shetland Islands) were often as small as the little elephants that in olden times flourished in what is now the Island of Malta.

In the case of the horse, as in the case of the elephant, the dwarfing was undoubtedly due to unfavourable surroundings. If the external conditions were sufficient in (geologically speaking) a comparatively short time to dwarf the horse until it was actually smaller than the "fossil horses" of the remote Eocene epoch, it is not surprising that man—with his wonderful control over Nature—is able even in a single generation to greatly modify the horse and other domestic animals. That in a few centuries the large, highly nervous race-horse with his wonderful speed and courage has been evolved out of Eastern and native ponies is a matter of history, and everybody knows that while some are now engaged in breeding pigmy horses little over 30 in. in height, others are as successfully breeding huge, powerful animals as wonderful in their way as their pigmy relatives. It may even be said that a recognised part of the breeder's work consists in modifying, through changes in the external conditions, the animals to which he happens to devote his special attention, just as horticulturists, by food, heat, and timely shelter, alter plants until all resemblance to their wild stock is as good as lost.

Breeders of Shetland and Polo ponies, and for that matter breeders of race and heavy horses, know well enough that to have any chance of success they must exercise the utmost vigilance over the conditions under which their foals and colts are reared. Hitherto, as far as I can learn, breeders have not had at their disposal any very accurate information as to the rate of growth of horses either during development or after birth, and hence, though aware that growth is rapid during the first year, they have been without any certain index as to when changes in the food, temperature, &c., are likely to produce the maximum effect.

Having for some years been collecting data bearing on the development and rate of growth of the horse, I propose now placing on record such facts as are likely to prove interesting and suggestive to breeders and to lead, perchance, to the influence of various kinds of treatment before and after birth being systematically investigated. In studying the rate of growth of the horse it is hardly necessary to point out that on the one hand allowance must be made for the

influence of the external conditions, and on the other for hereditary influences, *i.e.*, the stereotyped changes ultimately due to the environment. In other words, that in an investigation of this kind the surroundings should be as natural as possible, while the animals used should neither be characterised by an hereditary tendency to produce either very large or very small offspring. Bearing these points in mind, I selected for observation the offspring of horses from 14 hands to 14 hands 2 inches in height—the height at times reached by horses living in an almost wild state in the West of Ireland—and I provided the foals and colts under observation with as natural surroundings as circumstances permitted.

Having fixed on the size of the horses to be studied, it was next necessary to consider how the rate of growth before and after birth could be best determined.

The difference between a tall and an undersized man is mainly a difference in the length of the limbs, but in the case of the horse the height, as commonly understood, instead of bearing, as in man, an intimate relation with the length of the hind-limbs, is intimately related to the length of the fore-limbs.

The height of a horse, it is hardly necessary to state, depends mainly on (1) the length from the elbow to the ground; (2) the length and obliquity of the shoulder-bone (*humerus*); and (3) the length of certain spines of the dorsal vertebræ—the spines which give rise to the more or less arched ridge known as the withers.*

In the living animal it is impossible to measure the length of the vertebral spines, and only possible to estimate roughly the length and obliquity of the *humerus*, and hence it will be necessary in studying the rate of growth in the horse to trust chiefly to the length of the fore-limb as measured from the elbow to the ground. In man, the limbs belong to the common or ordinary vertebrate type, but in the horse they have departed as far from the general plan as highly useful structures well could—for, instead of five digits, as in man, there is but one complete digit, and in their hard parts the limbs are infinitely more highly specialised than is the case in any other mammal, and more profoundly altered than even the wing of a bat.

Influenced by the doctrine of recapitulation (the belief that each animal climbs its own ancestral tree), not a few were wont to believe that when a sufficiently young horse embryo was examined the fore-limbs at least, as in the early Eocene "fossil horses," would be pentadactylous, *i.e.*, have rudiments of five digits. This, however, is not the case; at no stage in the development (in the life-history as distinguished from the ancestral history) of the horse are there any visible rudiments or vestiges of the first and fifth digits; in other words, the horse is at the most tridactylous, and only one of the digits—the one corresponding to the human middle

*Than the height at the withers it would be difficult to find a less trustworthy index of the size of a horse. The height at the elbow is a safer guide, or, seeing that a horse (like a man) propels itself by the hind limbs, the height at the croup should be taken into consideration.

finger in front and the human middle toe behind—ever comes into use.

In the case of the horse, the first rudiments of limbs appear in the form of short bud-like outgrowths between the twenty-first and twenty-eighth days. The growth is at the outset so deliberate that even at the end of the fifth week the limb rudiments are only about one-eighth of an inch in length. After a time, however, the rate of growth is accelerated, with the result that, before the middle of gestation (the twenty-fourth week) is reached, they are relatively as large as in the full-grown horse. Having reached this size, it might be assumed that they would continue to maintain the same proportions up to the time of birth. This assumption would, however, be wide of the mark, and in fact would never be made by anyone aware of the great relative length of the legs in the new-born foal. To have a chance of surviving in a wild state—of escaping prowling wolves or hungry hyænas, jackals and hunting dogs—a foal must almost from the moment of its appearance on the scene be capable of keeping up with the tr op into which it is so unceremoniously introduced—sometimes, apparently, to the annoyance of the ever-watchful leader and head of the family.* To succeed in this it requires legs long enough to gallop at least as fast as the older members of the herd. It is doubtless for this reason that during the second half of the period of gestation the limbs grow very much faster than the trunk, with the result that for some weeks before birth they are relatively not only extremely long, but so wonderfully perfect in all their parts that, as in certain other wild ungulates, a foal is no sooner ushered into the world than it is galloping merrily along, carefully shadowed by its dam."

The Professor then gives a detailed description of the rate of development and growth of the different parts of the embryo foal during every week of its fœtal life, which shows that before the middle period of the gestation—that is, prior to the twenty-fourth week—the bones of the limbs are nearly as possible of the same relative length as in the adult. But from the twenty-fourth week onwards, the limbs grow faster than the trunk. In the front limb the increase in growth is mainly below the knee joint, while in the hind limb it is chiefly below the stifle or thigh joint. In both fore and hind limbs the increase is greatest for some time in the fore and hind cannon bones. This increa-e in the cannon bones during the second half of the period of gestation explains to a large extent the great length of the foal's legs at birth ; it also accounts for the fact that the cannon bones—the bones considered of such immense importance in all kinds of horses—increase but little in length after birth. In the case of a thoroughbred, for instance, the cannon bone appears only to increase about 1¼ inch after birth ; they may, however, increase three or even four inches in circumference in a 14 hands horse. The Professor adds : "Further inquiries may show that during the last eight weeks

*Stallions in a wild state sometimes endeavour to compel mares to leave their foals—thus all the more ensuring that only vigorous offspring survive.

of fœtal life, there is a rapid formation of bone, a hardening of tendons and ligaments, and a strengthening of the muscles, so that immediately after birth the foal may, even in times of stress, keep its place in the herd." He then deals with the rate of growth of the foal after birth. He says: "It might have been assumed either that the increase would be continuous and equal during the first two or three years, or that, rapid at first, it would gradually diminish as the growth power of the bones was lost, but my observations show that the rate of growth is decidedly unequal even during the first three months."

From data already collected, it appears that the growth, rapid during the first month, is considerable during the second, but more pronounced during the third, while from the fifth month onwards the rate of growth may be said to gradually diminish; there being, however, ups and downs related to the shedding of the coat, weaning, or other distributing causes. He then describes in detail the rate of growth. During the first year the total increase in height at the withers may be about 16½ inches; during the second year it may not be more than 8 inches; and during the third it may be under three-quarters of an inch. After the third year increase in height, if there is any, results almost entirely from a further lengthening of the vertebral spines that form the skeleton of the withers. The length of these spines, he says, "is intimately related to the size of the head," a statement which can be accepted as of general application. The following table shows in a very graphic manner the rate of growth in a horse during the first three years:—

Age.	Height at Withers.	Height at Croup.	Girth.	Length from top of head to line between upper margin of nostrils.	Length from inner corner of eye to upper margin of nostril.	Length from point of elbow to ground, the leg occupying a vertical position.	Length from point of hock to ground, the shank having a vertical position.	Circumference below knee.
	In.	In.	In.	In.	In.	In.	In.	In.
At birth	36½	38	30	12¼	5½	25	18	4¼
End of 1 month ..	41	42½	38½	14	6¼	27½	19	4¾
,, 2 months	42⅛	44⅛	42	15¼	7	30⅛	20⅛	5¼
,, 3 ,, ..	45⅛	46¾	46	15⅝	7¼	30¼	21¼	5¾
,, 4 ,, ..	46¾	48¾	48	17⅛	7½	31⅝	21¼	5¾
,, 5 ,, ..	48	49	49½	17⅛	8	31⅝	21¼	5¾
,, 6 ,, ..	48⅛	49⅜	52½	17½	8¼	31¾	21½	6
,, 7 ,, ..	49¾	51¼	53½	17¾	8⅜	32	21¾	6
,, 8 ,, ..	50½	52	54	18	8½	32¾	22⅛	6
,, 9 ,, ..	50⅝	53¼	56	18⅛	9	33	22¼	6
,, 10 ,, ..	51⅛	53⅜	56½	18½	9⅛	33	22½	6
,, 11 ,, ...	52½	53¾	57¼	19	9½	33¼	22	6⅞
,, 12 ,, ..	53	54	59	19¼	9¾	33½	22½	6¼
,, 24 ,, ..	56¼	56½	64	20¼	10¼	33½	22½	6¾
,, 36 ,, ..	57	58	68	20½	10½	33¾	22½	7½

Professor Ewart then proceeds:—

"Why, it may be asked, is the growth in the horse arrested so much sooner than in man? In the horse, as in man, the majority of the long bones consist of a shaft and of two end pieces (epiphyses). The increase in the length of the typical long bones takes place at the junction of the shaft with the epiphyses. This zone of growth is a source of weakness, and the sooner the terminal pieces—which by their free ends enter into the joints—firmly coalesce with the shaft the better. In the horse, this fusion takes place at a comparatively early stage, and when it has been once effected all further increase in length becomes impossible.

The question may now be asked, Can any practical use be made of all this information as to the rate of growth in the horse?

To this question an affirmative answer may very safely be given. In England it is often taken for granted that the sire counts for infinitely more than the dam. If the sire happens to be more impressive than the dam he will doubtless count for most in the characteristics of the offspring, but a sire, however good, can no more make up for want of quality in the dam than good seed can yield a good return regardless of the nature of the soil in which it is sown. To begin with, it is quite as important that the germ cell provided by the dam should be as perfect in every respect as the infinitely smaller germ cell supplied by the sire. Further, unless before development begins there is stored up an abundant supply of the material needed for the developing embryo, and unless all through the period of gestation the food contains the ingredients requisite for building up the bones and other tissues of the developing foal, the result must of necessity prove disappointing. However perfect the sire, he can no more assist in providing nourishment or suitable conditions during development than he can assist in ministering to the wants of the foal after birth.

But the inquiry as to the rate of growth of the foal mainly shows that from the sixth week of development there is an ever increasing demand for bone-forming material. This demand, great enough during the later months of gestation, is especially urgent during the first three months after birth. I might almost say during the first five months, for it is during this period that the growth of the bones mainly takes place. It may hence be said that, with the help of the information submitted, the breeder should be better able to so regulate the food of his brood mares that an abundant supply of bone-forming material will be available, not only during, but for some months after, gestation, and be in a position to so treat his colts during their first two years that they may reach either a maximum, an average, or a small size, be provided with the best possible chance of forming large ivory-like bones, and, what is perhaps of equal importance, strong ligaments and tendons, capable of withstanding sudden jars and strains."

D. H.

DAIRYING.

Cow's Milk and its Constituents.

In a report of investigations made at the New Jersey Agricultural Experiment Station, an average analysis of cow's milk is recorded which may be accepted as a guide and useful information on dairying subjects.

The appended analysis shows a full proportion of butter-fat and must have been made with milk of profitable cows at least :—

VARIATIONS IN THE COMPOSITION OR QUALITY OF MILK DUE TO NATURAL CAUSES.

Milk is not a product of fixed composition. Both the total amount and the proportions of the constituents contained in it are influenced by a variety of conditions, the chief of which is, perhaps, the individuality of the cow. Breed, food, age, health, period of lactation, and time and season of milking are also determining factors.

Of the constituents of the dry matter of milk, viz, butter-fat, proteids (chiefly casein and albumen), sugar, and mineral salts, fat seems to vary more than the others, though each may vary considerably. Normal milk may be said to contain on the average the following amounts and proportions of the different constituents, also weights in a gallon of 10 lb. 2 oz. :—

	Per cent.	oz.
Water	87·50	141¾
Total solids	12·50	23¼
Butter fat	3·50	5¾
Casein and albumen	3·75	6
Milk sugar	4·50	7¼
Ash (mineral salts)	·75	1

This average composition has served as the basis in both State and city governments for the enactment of laws or ordinances, the purpose of which is to prevent watering, skimming, and other forms of adulteration. The standards adopted seldom require more than 12·5 per cent. total solids and 3 per cent. of fat. Thus what may be regarded as the average quality of milk usually exceeds the limit fixed by the various laws, particularly in fat content.

Normal, or whole milk, will, however, show wide variations in both directions from this standard; that is, it may be very much richer or very much poorer.

The influence of breed is also very marked, so much so that dairy breeds are classified into milk and butter breeds; that is, those which give a larger quantity of poorer quality, and those which give

a smaller quantity of a higher quality. The milk from animals which naturally produce large quantities shows average quality, and that from animals which produce a smaller quantity shows a quality considerably above the average. That the content of fat in milk varies more than the other constituents, is also distinctly shown in the investigations of milk from different cities here reported.

The food is an important factor affecting the quality of milk, not always appreciated. A specific breed possesses certain capabilities, the values of which are dependent in large measure upon the food that is supplied. Owing to the inherent tendency of the animal to produce milk of a definite composition, food may not exercise a positive and immediate influence in improving the quality of the milk; still, a cow cannot reach her normal capacity in this respect unless she is supplied with sufficient food.

The age and health of the animal also affect the composition of milk. Young animals produce richer milk than older ones, though much depends upon health, vitality and vigour. The period of lactation, that is, the length of time which has elapsed since the birth of the calf, also exercises an influence upon the composition of the milk. The milk flow is usually greatest, and the milk poorest, soon after calving; as the period increases the flow gradually falls off, and as a rule the quality improves. However, the influence of all these factors is not so marked in mixed milk as in the milk of individual animals.

DISCUSSION OF RESULTS OF ANALYSES.

In the samples obtained from New Brunswick, the variation in total solids ranges from 11·82 to 14·03 per cent., a difference of 2·21 per cent. The variation in fat ranges from 2·99 to 4·57 per cent., a difference of 1·58 per cent. The average composition of the milk, however, is higher than the commonly accepted average composition of normal milk. In but one case is the variation in composition so marked as to indicate that the samples were not fairly representative of whole milk.

In the samples taken from Newark, the total solids range from 10·81 to 14·86 per cent., a difference of 4·05 per cent.; while the fat ranges from 2·56 per cent. to 6·92 per cent., a difference of 4·36 per cent. The average composition is, so far as total solids are concerned, practically identical with the New Brunswick average, though showing a slightly higher percentage of fat. In one sample, No. 57, the content of total solids and fat is so low as to create a suspicion of adulteration. Another sample, No. 59, contains an undue proportion of fat.

In the samples from Trenton, the percentage of total solids ranges from 10·64 to 13·96 per cent., a difference of 3·32 per cent. The fat ranges from 2·97 to 4·80 per cent., a difference of 1·83 per cent. In one sample only, No. 84, does there appear to be an abnormally low content of total solids and fat.

In the samples from Camden, the range in total solids is from 12·06 to 16·55 per cent., a difference of 4·49 per cent. The range in fat is from 3·28 to 7·76 per cent., a difference of 4·48 per cent. The average composition of the milk of Camden is very much higher than that from other cities, both in total solids and in fat. Only two samples, Nos. 89 and 107, show an abnormal percentage of fat.

On the whole, the milk supplies of these cities may be regarded as extremely good, the average composition being: Total solids 12·97, fat 4·13, casein and albumen 3·37, sugar 4·75, and ash 0·72 per cent.

SOURCES OF SUPPLY.

In New Brunswick and Trenton, the milk supply is derived almost entirely from local producers, who deliver the milk themselves. In Newark and Camden it is derived both from local producers and from large dealers, who procure their supplies from more distant points. In Newark very considerable quantities are shipped from Sussex and Warren counties in New Jersey, and neighbouring sections of New York and Pennsylvania. In Camden a large portion of the supply comes from the more southern sections of New Jersey.

Some inquiry was made in reference to the animals in the different dairies. It appears that the majority of the dairies contained animals of the Channel Island breeds, while a few contained pure-bred Jerseys, Guernseys, Holstein-Friesians and Ayrshires.

Cooling Milk.

The best and cheapest method of cooling milk on the farm previous to the product being taken to the factory or creamery is a subject in which farmers are deeply interested. Unfortunately, many producers pay little attention to the absolute necessity which exists, if good butter is to be produced, of delivering the milk in a thoroughly sound and wholesome condition. Even the use of an ordinary cooler is, in the majority of cases, dispensed with. Mr. A. N. Pearson has advocated sal ammoniac and saltpetre in equal parts, as a cooling mixture, which has the advantage of being cheap and very effective. Three pounds each of these ingredients dissolved in a gallon of water will reduce the temperature of a gallon of milk by about 40deg. F., if the full cooling effect is conveyed to the milk; and he gives the following directions for use :—The salts, which must be quite dry and ground to a fine powder, are weighed out, put into the measured quantity of water, and stirred slowly about until completely dissolved; the crystals, in going into the liquid form, absorb heat and produce an intensely cold solution. This can be used for cooling purposes, and afterwards, by evaporation, the crystals can

be re-obtained for use again. Hence, with care there need only be a trifling loss, and the same portion of cooling salts can be used for an indefinite period. When cooling milk by means of freezing mixtures it will be found most economical to reduce the temperature first as much as possible with water only, and then to complete the cooling by means of the cool solution. Thus, to begin with, the milk in the bucket as it comes from the cow will be about 95deg., and by immediately running it over a cooler through which cold water was flowing it might be cooled down to 75deg. By then passing it a second time over the cooler through which the cold solution was flowing it could be cooled from 75deg. down to 55deg. Thus only half the cold solution would be needed that would have to be used if the whole of the cooling were done by its means. In this way 3lb. of sal ammoniac, 3lb. of saltpetre in 1 gallon of water would then cool 2 gallons to the desired temperature. At this rate, to cool 50 gallons 75lb. of each salt would be needed; and as it would be advisable to have two lots, one to be evaporating and drying while the other was in use, 150lb. of each would be required, or say 1½cwt. The salts, which, as before stated, must be powdered and quite dry, are best dissolved in a cask or wooden tub, covered with a lid at the top, provided at the bottom with a tap, and wrapped around and underneath with 6in. or 8in. of straw or thatching to prevent loss of cold. The evaporation of the solution after it has been used should be done in a shallow pan or tray. A number of kerosene tins cut in half lengthwise and provided with handles will do if nothing else can be obtained. Then place over a slow fire, so that the water will evaporate gently without boiling, loss of salt by splashing or spurting being avoided. When the material is evaporated nearly to dryness the hot, somewhat pasty mass should be dug out of the pan and spread out on clean wood or iron to finish drying in the sun or in some warm, dry place. When perfectly dry it should be powdered up ready for use.—*Rural World.*

Cream Separators and Butter Fat.

We have heretofore frequently taken the ground that farm separators is the final solution of the creamery problem, and the time will once more come when the creameries will resort to the gathered cream instead of the whole milk system, says the farmer. Only in a few localities are we ready for this change. Changes of this kind must come gradually as the farmers and creamerymen alike see the obvious advantages of the new system. It is well, however, in the meantime to keep before them advantages.

The first is that the skim milk, which on the farm is one of the important products of the dairy, is always in the very best condition for feeding as it comes from the farm separator and can be fed warm

and sweet as nature intended it to be fed. Fed in this way, with a balance of a mixture of corn meal and oats until the calf is thirty days old, and with shelled corn afterwards, it makes a balanced ration, and upon this feed the skim-milk calf can flourish.

The second advantage is that you have only the cream to care for instead of the whole milk, involving a smaller cream house, less ice, less water, less work, and more satisfaction.

The third advantage is that the cost of hauling is largely reduced; we should say two-thirds, at least.

In addition to this there is a fourth advantage to the creamery, namely, that it can cover a much wider range of territory and, therefore, do a much larger business at a smaller expense per pound, thus removing one of the greatest obstacles to success in the creamery business.

This is one side of the question; now for the other. It will very largely increase the total cost of separators. A hundred hand separators will cost many times the amount of one separator at the creamery.

Second, the hand separator requires more care than a milk bucket, though perhaps not much more than milk buckets require if they are properly cared for.

There is another danger, although it is not peculiar to the hand separator, and that is the careless handling of the cream.

Many housewives are troubled over the fact that there is too much butter fat in the skim milk that goes to the calves and pigs.

The cream separator will prevent this waste, says an exchange, and pays well in any dairy having eight or ten good cows. For a less number it is better to use the deep setting system.

We prefer the shallow open pan system, if well managed, rather than the dilution method. There is too much loss in butter fat in both methods, however, as usually managed, and the very best plan is to use deep setting in warm water, even if but one or two cows are kept.

Have your tinner make one or two shotgun cans, eight inches in diameter and twenty inches deep, with a wide flange around the bottom, perforated with holes to allow free circulation of water underneath the can. A cover with a fine brass screen in the centre allows free ventilation. Each can should have a strong handle for lifting. We never paid over 75c. for such a can complete, made of the best heavy tin. A glass with gauge and faucet may be attached, but it is not necessary to insure good separation.

Insist that the milk be brought to the dairy room just as soon as milking is done. Some farmers wait to finish other chores before going in with the milk, but the warm milk should be immediately strained into the cans and plunged into the cold water. Why?

The butter globules are lighter than any other portion of the milk and will immediately rise to the top, if possible. By gravity and the effect of the cold water circulating around and underneath the can,

which contracts upon the milk next to the can's surface, a circulation is started which increases as the warm milk becomes chilled.

If the milk is all from fresh cows it is a very easy matter for all the butter globules or cream to rise to the surface. If the cows, or any of them, are well along in lactation the milk becomes more or less viscous or adhesive. When in this condition the fat globules find it more difficult to wend their way to the top. That is why it is more difficult to get all the cream when the cows have been milked a long time.

The milk from fresh cows is more fluid, that is, apparently contains a less per cent. of solids, including butter fat. The cream has no trouble to rise then, and does even in the shallow open pan set upon a shelf in the pantry. When well along in lactation the cow's milk is less fluid or contains a greater per cent. of solids, apparently, including butter fat.

In handling the milk a water-tight box may be used, but we recommend using a barrel, if not more than three shotgun cans are needed. This makes a cheap outfit, and just as good creaming may be secured as with a costly outfit.

Cut off one end of the barrel, down the staves to the second row of hoops. This gives sufficient depth to even submerge an ordinary can, if the barrel is full of water.

Have the barrel filled with cold water just before inserting the can of warm milk, both night and morning. Such frequent changing is not needed in cold weather, but is very essential in hot weather. A cake of ice is advantageous when it is hot.

Warm milk immediately strained and set in cans surrounded with cold water will force the cream to the top better than under any other treatment, except by the centrifugal cream separator. The skim milk from deep setting should never contain over two to six-tenths of 1 per cent. of fat, and many samples we have tested with the Babcock test never tested over one-tenth of 1 per cent.

Thousands of our readers make the very best butter you ever tasted, and they use the shallow pan or crock, dash churn, butter bowl and hand ladle. It is because they know how to make good butter, and are models of neatness in the manipulation of all details connected herewith.—*Texas Stock Journal.*

Danish Butter.

A leading New York commercial bulletin, *The Weekly Journal of Commerce,* writes :—

The Department of Agriculture has been telling the farmers something that everybody else has known for some time, chief among which is that Danish butter commands a preference in England. But it is too flattering to our butter to say that its chief competitor is the Danish. If Danish butter in the British market has any competitors they are Canadian and Australian butter rather than ours. The statement that Danish butter-making is the recipient of Governmental assistance gives an erroneous impression; most of the Government assistance consists of an official inspection so rigid that our butter makers would rebel against it. The effort of the Danish Government and farmers is to prevent any individuals with too great an appetite for gain from injuring the reputation of Danish butter. The butter trade of Denmark is one of the finest examples of individual enterprise and the willingness of farmers to adopt the most painstaking and scientific methods to be found in the history of commerce.

POULTRY.

Poultry Industry.

Mr. William Cook, Poultry Expert from England, who is on a business visit to South Africa, and is at present touring certain of the Eastern districts, has kindly consented to deliver courses of lectures on the Poultry Industry, to the members of Farmers' and Poultry Associations in the chief centres through which he may pass.

This Department is affording him the necessary assistance in connection therewith; and it is hoped that the members of the East London, Queenstown, Upper Cathcart, Stutterheim and Kei Road Farmers' Associations (who have been duly notified of Mr. Cook's intending visit) will avail themselves of the opportunity afforded of hearing what he has to say on this subject.

The subjoined newspaper reports in the *Natal Mercury* upon lectures delivered by Mr. Cook, are published for the information of all interested in Poultry Farming :—

Poultry Mismanagement.

Mr. Cook, the "Poultry King," gave the first of his series of lectures in Durban, which was fairly well attended. The chair was occupied by Mr. W. Short, president of the Poultry Club.

The lecturer said he was going to treat first on the mismanagement of poultry, and give some reasons why people did not make the industry pay. South Africa was, in its climate, very different from England. The heat was as trying to fowl as to man; therefore, the fowl wanted feeding and treating accordingly. The egg was made of what the fowl ate, and the richer the food, as long as it was suitable, the better the flavour of, and the more nutritious, the egg. If they fed fowls on onions, the egg would taste of onions. Eggs and fat poultry were an important item in this country, but very few fat chickens fell to the share of the Durban people, as he (the lecturer) had not seen one since he had been in the town. Poultry farming did not pay because people went into it without understanding the business, and thousands of pounds were lost. He had met with many people in the Colony who had lost from £200 to £500 in attempting to carry on a poultry farm. No business could be carried on unless the people who managed it were competent, and there were far more details in poultry farming than in most other businesses. He, however, asserted there was nothing in the way of live stock that could be made to pay better than poultry. Fowls were like a grocer's shop—they turned money over quickly. Particularly was this so with laying hens. The cry out here was that the fowl sickness cleared them all off. That was quite right, but that could be coped with in very many ways. There were thousands of fowls dying off because people did not know how to treat them, not only here, but in England, Australia, and other parts of the world. Fifteen years ago in England quite as many fowls died in some parts as now in South Africa. He had visited counties, and particularly Cheshire, where they could not rear more than 30 or 35 chickens out of every hundred they hatched, and could not keep 20 fowls alive out of 200 for two years. They died off with tuberculosis, liver disease, and worms in the intestines. He had found in many parts of England also that people had not had an egg, where they kept from one to 300 fowls, for three or four months in the autumn and winter. One of the first essentials in the keeping of fowls was grit. This served to fowls as teeth to animals. All mastication had to be done in the gizzard instead of in the mouth, and, if they were not supplied with the proper material, they would pick up the nearest they could find, and unfortunately swallow large pieces of hard material, such as three-cornered pieces of glass, coal, and even pins and needles if they could get them, and, as the inlet of the gizzard was more than twice the size of the outlet, when they swallowed these large hard substances, they could not pass them. Consequently, the gizzard became blocked, and sometimes the material remained in so long that the inside of the gizzard became rotten. Grit should be

broken rather small. Flint was the best he had used; white glass came second, old china third, and white crockery fourth. Anything of this kind could be used where there were fowls kept. It was necessary for young chickens to have sharp grit directly they were hatched—hence the cause of so many deaths in young chickens. Sharp grit meant health and happiness to the fowls, and profit to the owners. He strongly condemned the practice of keeping fowls too close at night. This, he said, often caused roup, chicken-pox and cold. Fowl-houses here should be open on one side with wire netting, and yet he found seven in every ten boarded all the way round, with just a few holes for ventilation. It was most important the fowls should be kept as cool as possible at night. They merely wanted a shelter from the rain and high winds, and the cheaper and the more insignificant the poultry-house, the better was it for the fowls. Perches should never be more than 18in. or 2ft. from the ground, and then the ventilation could be obtained at the top of the house. The perches should be made flat, 2in. wide, with the sharp edge bevelled off. A look-out should be kept for the red bugs, which, if not watched, swarmed the perches, and extracted the blood from the fowls at night. He did not know that fowls here were more subject to disease than in England. The sand fleas, however, were not experienced in England, nor was the tick, which got under the wing or thigh, and buried itself into the flesh. But insect powder would do away with both fleas and ticks. Then there were the ordinary fowl lice, with which he found old fowls, particularly in Durban, swarmed. These should be dusted two or three times a year with insect powder. Fowls had a great many enemies, but worms in the intestines were the greatest. Three parts of the diseases of fowls originated from this cause. He had opened some scores of fowls and chickens in South Africa, but he had only found one that had no worms. These pests not only extracted a certain amount of nutriment from the food, but they took the mucous, or lining from the intestines, and also extracted blood from the chickens. He had seen chickens, three months old, with scarcely a drop of blood in their body, and yet with hundreds of worms in their intestines. He had found worms in chickens, in every part of the world, but never in such numbers as in South Africa. But even these could be destroyed, if the chickens had not got too bad. Prevention was better than cure, and if they had a little tonic powder as chickens for the first three months, there would not be one chicken out of 20 that would have worms inside it. The lecturer here explained that chicken-pox in England went by the name of comb disease. This country was particularly free from tuberculosis, but he thought this due rather to the fact that worms, &c., killed the fowls before tuberculosis had time to develop.

At the close of the lecture, questions were asked and answered by Mr. Cook.

In the second lecture Mr. Cook will speak on the laying qualities of fowls.

SECOND LECTURE.

The lecturer said that feeding formed a very important item in poultry keeping. In the case of diseased fowls or bad layers, it was a waste of time and money to feed them. If good results were desired they should have good healthy stock. During his visit to the poultry yards in South Africa, he found that 17 people out of 20 fed their fowls on too-fattening food for egg production, the hens getting lined with fat, and yet having very little flesh on their breasts. Mealies were too much utilised as food for poultry in this climate. The white mealies grown here were certainly the best he had seen anywhere, but when fowls were kept in confined runs they ought to be fed very sparingly with them. In fact, during the hot months, they ought not to have a grain of mealies, and only where they had plenty of bush to roam about in and get plenty of insects should they be given mealies. With fowls in confined runs, the first meal in the morning should be of soft food, though it should not be given hot, except perhaps in winter months. It might be well to give them hot meal to clear the fowls of their old feathers and assist them in getting new ones quickly. He was aware that foodstuffs were dear in this country, but the price obtained for eggs compensated for the dearness of food. Laying hens particularly wanted change of food. Pollard coming from Australia was a very good food, and, mixed occasionally with bran, boiled rice or linseed, was very beneficial; but the best food was a mixture of biscuit meal—one double-handful to half a bucket of meal—which did not stick in the crop. Granulated meat, mixed with ordinary meal, was another excellent food; wheat was one of the best foods that could be used for laying hens, while oats, French buckwheat and Kaffir corn were also good. Fowls should be fed in troughs, V shaped, with a bar running over the whole length to prevent them getting inside and treading in the meal. In case they did not eat up the whole of the meal, the remaining portion could then be removed. It always did fowls good to make them miss a meal occasionally. At the end of February, March and April the birds should have poultry powders, which helped them to shed their feathers and brought them on to lay quickly. During March, April and May, also, a little boiled corn given in the evening induced them to lay more eggs than always feeding them on hard corn. He did not object to some mealies being given them during the winter months. Laying hens, if they were in confined runs, should never be fed more than twice a day, and they should be always given green stuff and fresh bones. When young birds were too fat they should be made to scratch for every grain of corn they got. Speaking as to the breeding of fowls, Mr. Cook said that the course to be pursued would depend upon whether fowls were intended for laying purposes only or for laying and table conbined. For the latter purpose pure hens need not be kept, but the male bird should always be pure bred and from a good laying strain. Pullets would lay from six weeks to two

months earlier from a pure bred male bird than from a mongrel cockerel. Mr. Cook stated what he believed to be the best crosses for both laying and table purposes, and said that the Orpingtons were considered to be the best for table and layers, their eggs being finer than Wyandottes, and their flesh whiter and more juicy.

Poultry Keeping in Rhode Island.

The report of the Agricultural Experiment Station at Rhode Island is always instructive. The poultry division is reported on by Mr. Brigham, and contains some exceedingly interesting and valuable practical matter, which contrasts strongly with the corresponding literature in our own country. It speaks of a very satisfactory movement amongst the poultry men of the State for the development of utility as distinguished from fancy qualities in breeds of fowls, and the desire to unite the capability of the increase of egg production with early and large development of marketable flesh. One exceedingly interesting paragraph is that on what are called "trap" nests, which are employed to determine which hens are the most productive, and to enable the owner to breed from those that are most prolific. Mr. Brigham says that for two years they have had very thorough trials of about twenty different kinds of trap nests, the simplest of which have been exceedingly efficient for the purpose. If trap nests, which retain the hen after she has laid, and so enable the egg to be identified, were used in this country we might have breeds of prolific layers instead of the scanty layers that are now too common in many varieties of fancy fowls.

In reply to the question as to which is the best breed of fowl, the sensible answer given is that there is far more difference between individual fowls of any one breed than between distinct breeds. It is obvious that there is great room for improvement among the fowls of each established breed, and it is by the study of individual birds, and not of breeds, that the greatest progress will be made in attaining the most prolific layers. As an all-round fowl, furnishing at once a good supply of eggs and plump-breasted poultry for the market, great stress is laid on a breed called the Rhode Island Red, which is regarded as a very promising bird.

With regard to feeding, the results of the experiments at the Rhode Island station seem to indicate that the food supply to laying hens confined in yards is generally deficient in animal food, and the importance and value of meat and fresh bone in furnishing animal matter to balance the starchy grains is evidenced by the largely increased egg production of the fowls. The large percentage of deaths in the artificial rearing of chickens is specially considered, and has been the subject of some very exhaustive and valuable experiments. Chickens in breeders, if fed on egg, liver and green

stuff only, showed a loss by death of no less than sixty-three out of every hundred, arising from digestive troubles terminating in diarrhœa. A second lot fed on grain alone showed a mortality of nearly 33 per cent., which also arose from digestive troubles, indicated by the enormous enlargement of the gall bladder.

Now comes a point of immense importance, which is not sufficiently recognised by many of our readers. When green stuff was added to the grain, the loss fell from 33 to 9½ per cent., and when the young birds were given proper food, consisting of egg, meat, grain and green stuff, the mortality again fell to 3½ per cent. We need not moralize on these statements, they speak emphatically for themselves. As Mr. Brigham states:

"By using a proper amount of animal food with the grain food, and supplying the necessary green food, a large proportion of the untimely deaths may evidently be prevented, provided, of course, that due attention be given to the other factors of environment, and the breeding from vigorous, healthy parents."

The value of fresh air and sunlight in preventing tuberculosis is strongly emphasised, and stress is laid on the necessity of providing due protection for the chickens during the extreme variation of the weather that takes place in the colder months in Rhode Island, where, it is needless to say, the cold is much more intense than in our own country. The writer says that four degrees of protection should be provided for what he terms brooder chicks, varying from a ventilated hover kept uniformly warm, to which the chicks can run as under a mother hen and warm up quickly, to an outside yard available in pleasant weather, as it is necessary that the chicks should have a sure refuge whatever may be the weather, and at the same time be induced to keep out in the open air and take exercise, as they would with the mother hen during pleasant spring weather.

Another important point to which Mr. Brigham alludes is the different methods of egg preservation. A very careful series of tests have shown that the two best methods are a 10 per cent. solution of water glass (silicate of sodium), and also the mixture of lime water and brine made in the proportion of 1lb. of quicklime to half a pound of common table salt, on which is poured a gallon of boiled water. In either of these liquids eggs are successfully preserved for a period varying from seven to eleven months. In this country the quicklime and salt can be much more readily obtained than the sodium silicate, and is equally efficacious. Either of these methods is infinitely superior to the dirty, troublesome, and comparatively inefficacious plan of greasing the eggs or varnishing the surface in any manner. It is absolutely necessary that eggs, to be preserved successfully, must be put into the liquid in a perfectly fresh state.—*The Field.*

MISCELLANEOUS.

Olive Oil.

In an article on "Olive Culture" by Mr. W. J. Allen in the *Agricultural Gazette* of New South Wales for December last, Mr. Chas. Chaffey. of Renmark in South Australia, who makes a large quantity of olive oil, furnished the following observations:—

"Olive trees were first introduced into South Australia by Sir Samuel Davenport and the Sheriff of Adelaide, W. R. Boothby, Esq., C.M.G. This was about thirty years ago, and the planting of the olive near Adelaide by these gentlemen, and subsequent manufacture of oil by them, proved conclusively that the soil and climate of South Australia were well suited to the successful culture of this fruit. When the colony of Renmark, on the River Murray, was started in 1888, I was informed by people who had cultivated the olive near Adelaide that the trees would not grow well, nor bear fruit, at any distance from the coast, on account of the extreme heat and dryness of the atmosphere. This was, however, soon proved to be a mistaken idea. Trees were planted at Renmark, and at five years from the time of planting they had attained the size of ten-year-old trees growing in the vicinity of Adelaide. In regard to fruit, also, it has been found that our Renmark orchards bear a much heavier crop per tree than do those of the same age near the coast,—so much so that the growers of Adelaide and vicinity will not credit the returns we get from our orchards here. It should be borne in mind, however, that our trees are grown under irrigation, whereas those about Adelaide depend largely, if not altogether, on the rainfall, and it is doubtless owing to an abundant supply of water, as well as the advantages of climate and the liberal use of fertilisers, that the good results obtained in Renmark are to be attributed.

Any kind of soil has been thought to be good enough for the olive, and there is no doubt the tree will live in almost any soil; yet there is no fruit-tree that responds more readily to good soil, good care and good cultivation. My own trees are planted on the poorest soil on the place, but they have received good care and have been well fertilised, and my experience is that they pay a very fair return on the outlay. This return I expect to be still more satisfactory as, through Federation, our market becomes larger and steadier.

I have not as yet gone in for pickling olives, as I find that as yet the demand for pure olive oil is in excess of the supply, and it is less trouble to make good oil than good pickled olives. The manufacture of this article is found to be a very profitable industry in California, however, the demand for pickled olives throughout the States being enormous; but in Australia the public palate is not educated to an

appreciation of this dainty, and consequently there does not seem to be much opening in this direction as yet.

In planting an olive orchard, it is, I think, preferable to use seedling stocks, budded, rather than truncheons, the former making stronger and better trees, besides being less addicted to growing suckers. Truncheons make a good growth after the first year, but, as they have no tap-root, the roots are near the surface, and the tree is top-heavy, and liable to blow over in a wind storm. This is particularly the case when the ground is soft after a heavy rain or an irrigation. The best varieties to plant for oil are the Bouquettier, the Salome, and the Verdale. The last mentioned has not as large a proportion of oil in the fruit as the former, from which the oil runs after crushing without pressure. The Lucca variety is also highly spoken of around Adelaide, but I cannot speak of these from actual experience, as my trees of this kind are not yet bearing, though they have made good growth and promise to do well. As to the distance apart to plant trees, I advise a less distance than 30 feet—say from 20 to 25 feet. If the trees are planted far apart they must be allowed to grow to a considerable height, in order that they may carry a large crop; but if the tops are high the fruit cannot be properly picked by children, and it will not be found to pay to employ men for this purpose. Therefore, cultivate well, fertilise heavily, and keep the trees low, in order that the fruit may be easily picked. The trees do not require heavy pruning; they should be headed low and the centre kept open to allow a free circulation of air, which tends to keep them free from black smut and the black scale, which is their greatest enemy. As the olive bears on old wood, this light pruning is necessary, for any large amount of wood removed will tend to lessen the crop.

The fruit should be picked when it becomes a deep wine colour. After this stage is reached and passed, the oil becomes greasy, and the result is an increased quantity of oil, but of an inferior quality. On my place we employ children to pick the crop. Both boys and girls can do the work, and they are paid by the box, which contains one-third of a hundredweight. The method of picking is to spread sheets (made from wheat bags) on the ground beneath the tree, and to strip the fruit from the branches by hand, allowing the olives to drop on to the sheets, whence they are poured into the box. Ladders are required to reach the upper branches. The boxes of fruit are carted to the mill as soon as picked, when the business of making the oil is begun. In California, the olives are partially dried before being crushed; but we have found that the fruit is more easily handled and that the oil runs more freely when the berries are comparatively fresh. We keep them sometimes for several days before crushing, but no longer than we are obliged to from pressure of work.

My mill consists of two large round stones, revolving in a round stone trough, both stones and base being cut out of Aberdeen granite. It is worked by horse-power, and will grind about 2 cwt. at a time,

being refilled every thirty minutes, or less. After being ground, the fruit is put into large flat galvanised pans, from which it is shovelled into esparto grass mats, 2 feet in diameter, which hold about 40 lb. each. These mats (called *cabas*) are made expressly for this purpose, and are imported from the South of France. When filled, they are piled one on top of another in the press, with a steel plate, 2 feet in diameter, between each one and the one above it. These plates assist materially in forcing out the juice and oil when the pressure is applied. The liquid runs into a receptacle, or pan, at the base of the press, on which the ma's rest, and thence it pours into a bucket placed beside the press to receive it, which is emptied by an attendant as soon as full.

My presses consist of a beam press and a screw press for the first pressure, and a hydraulic wool dumping press for the second and final pressure. The first has a beam of red-gum, 12 in. x 14 in., 55 feet long, which, when weighted with scrap at the extreme end, gives a pressure of about 15 tons. The screw press (the screw of which came out of an old wool press) gives about the same pressure, while the hydraulic press has a pressure of from 75 to 80 tons. After the full pressure has been applied by the beam and screw presses, the mats are taken out and each one doubled up, to loosen the pulp, and dipped in cold water, after which they are piled up, as before, in the hydraulic press. The oil obtained from the first pressure, and the second pressure with *cold* water, is virgin oil, and brings the highest price. When the oil has ceased to run from the hydraulic press, the mats are taken out and emptied and the residue is put aside, to be, after all the olives have been subjected to the first process, mixed with hot water and once more put through both mill and press, only the hydraulic being used for this final pressure. The oil thus obtained is of inferior quality and is sold as *salad oil*, bringing a lower price than the virgin oil.

In the meantime, the liquid from the first pressure has, as it was removed from the press, been put into a tank, which connects with the separator. The latter is another tank, holding about 50 gallons of water, which has in it a simple arrangement of pipes, by means of which the olive-juice is first conducted to the bottom of the tank and thence flows up through a tin rose, meeting, as it comes out, water flowing from another rose connected with a pipe immediately below it. The water, which must be under pressure, mingling with the juice, sets free the particles of oil, which rise to the top. When a sufficient quantity of oil has accumulated on top, it is drawn off by means of a tap, situated about a foot from the top of the tank. The heavier matter sinks to the bottom and is drawn off through a syphon, which conducts it into a tank with a goose-neck, whence it again flows into another and smaller tank. In these tanks the water is kept at a level of 3 inches from the top. Any oil that may have escaped from the separator accumulates on top of the water, and can be removed, the second tank affording a still further opportunity of saving every particle of oil.

The second-pressure oil—that is, the oil secured after dipping in cold water—is treated differently. It is put through a series of tanks with overflow pipes arranged to keep the water at a level just below the edge of the tank. As the juice is poured in the oil accumulates on top of the tanks, and is drawn off by means of taps placed near the top. This separator is also used later on for the third pressure oil.

The oil of different grades is put into separate tanks, which hold from 100 to 200 gallons each, and is allowed to stand and settle until the weather becomes a little warm, when it is drawn off and strained through cotton wool. Further filtering is unnecessary if the oil has been allowed sufficient time to settle and clear itself. Of course, if the room where the oil is stored can be heatedly artificially, the oil will be ready for market much earlier in the season than if left till the beginning of the warm weather.

When clear and ready for market, I put my oil in 10-gallon milk tins and ship it to Adelaide. These receptacles I have found, after a number of experiments, to be the most convenient available. They are strong, easily handled, and easily cleansed. In Adelaide the oil is bottled, or sold in bulk, if intended for use outside the colony. At one time we did our own bottling also, but I soon found that this could be done more cheaply and satisfactorily in the city."

Cold Storage and Refrigeration.

The enormous progress made in recent years in matters connected with cold storage and refrigeration has affected the shipping industry perhaps more than any other business; and the striking fact that by means of this advance Canada has been able to increase her butter exports from £360,000 in 1896 to £1,200,000 in 1899, her cheese exports 25 per cent., and her export of eggs, fruit, poultry, and other perishable food products 33 per cent., is very convincing testimony of the truth of this assertion. The improvements in refrigeration machinery have been amongst the most potent causes of the great increase in the size of latter-day steamers, for perishable cargoes want plenty of space, and cooling chambers on shipboard, in order to be economical, must be large and roomy. A great deal of useful and interesting information on this subject is afforded in a report just published by Mr. Arthur Getty, of Her Majesty's Consulate at Chicago, the details of matters connected with cold storage and refrigeration in that town being gone into very minutely. It appears that in Chicago there are four large cold storage houses, representing some millions of cubic feet, each carrying on an extensive business in meat, eggs, poultry, butter, cheese and fruit, and that the science of artificial refrigeration is carried on successfully in oil refineries, glue factories, indiarubber works, packing houses, dwelling houses,

hotels, restaurants, distilleries, breweries, soap and chocolate factories and wine merchants' establishments.

During the Paris Exhibition the demand for frozen poultry was enormous, and this year, one company alone shipped 40,000 boxes from Chicago to the United Kingdom and France, whilst it is expected that the export of poultry this year will be the largest on record. An enormous business is already done, it appears, in the egg "canning" industry, America being said to be the only country yet engaged in this business. The extent to which the trade has already grown may be estimated from the statement that two packing-houses have now in their "chill" rooms about 216,000,000 eggs, obtained from the Western States in April and May last, at from 4d. to 6d. per dozen, and for which the wholesale price is now about 7½d. per dozen. Before being put into the cold chambers, which are kept at a temperature just below freezing point, the eggs are carefully "candled," *i.e.*, examined by being held up to a strong light in a dark room, and either packed in white wood boxes or stored in bulk in 50lb. tin cases. It is suggested that when taken out and thawed eggs should be used as soon as possible, that they should not be stored near cheese or other strong smelling product, and that the temperature of the room should not vary as much as half a degree.

The storage of butter is also carried on with the same happy results, the practice of freezing this product being said to be more successful than that of cooling it, and immense quantities which went into cold storage in Chicago in June last at 9½d. a lb. are now readily marketed at 10½d. We are further told that experiments have shown that cheese will keep one year in cold storage, if it is in ripe condition previously, and dampness is excluded from the room. Successful results have also been achieved in the storing of all kinds of meats, at temperatures varying from 30 to 40 degrees, whilst the correct temperature at which fish should be kept, after first being frozen, is said to be 25 degrees. It is asserted that fish can be preserved for an indefinite period, though six or eight months is generally considered long enough; and the process includes glazing, which is done to prevent shrinkage.

The average temperature for apples is 32 degrees. They are kept in barrels or boxes, and will, if good fruit, keep for one year. In this way fruit stored in October at two to three shilling per barrel of 150lb. will sell in May, in Chicago, for nine shillings. Grapes, bananas, lemons, oranges, peaches and pears have been treated in like manner, and it is recommended that all soft fruits be placed in cold storage when ripe. In the same way the storage of vegetables has been carried on with capital results, cabbage, carrots, potatoes and onions being kept quite sound for months after being packed.

An interesting feature of the Chicago refrigerating installations is that of possession by one of the companies of a street pipe-line system, whereby the liquid ammonia is carried five miles from the factory, thus supplying with refrigeration the produce and commission men along the route. This plant is not peculiar to Chicago, since

there are other cities in the United States where refrigeration is supplied in the same manner to hotels, grocers, butchers, restaurants and private houses. The people of the United States, owing, no doubt, to climatic reasons, have been thoroughly educated in the use of ice, and therefore companies which lay themselves out for ice-making and pursuits connected therewith have a far more numerous body of customers than in this country. Nevertheless, the need for preserving fruit, meat and vegetables is even more pressing in a little North Sea island like ours than it is in a great world-extending continent like America, and whether the preservation of the harvests is conducted in England or the United States, the consumers of this country are bound eventually to obtain their share, a result which, it is gratifying to remember, can only be reached by the participation of the mercantile marine in the extra distribution involved.—*Liverpool Journal of Commerce.*

Hedge Trimmings.

Although the daily press has, with its usual perception and penetration, decided that the recent case in the Grantham County Court anent the placing of yew clippings upon the highway settles a new point of law, there is nothing novel about it. It has long been well settled law that a person who places dangerous materials where another person's cattle can reach them must take the responsibility for such a breach of the law. The only novelty was as to the distinction between a highway and a neighbour's land, which in law amounts to nothing. Before discussing the meaning and effect of the case it may be well to mention the chief points which were proved in it. The owner of a heifer claimed seven pounds for its loss through its death being caused by its eating yew leaves which the defendant had cut from a hedge and left upon the roadside. The facts of the case do not seem to have been seriously disputed. The learned judge held that the case did not depend upon negligence, believing that neither the plaintiff's daughter (who was in charge of the animal) nor the defendant were aware of the danger of yew leaves to cattle, but that it depended upon the fact of the deposit of such trimmings being a nuisance. His Honour expressed the opinion that there could be no doubt that it was a nuisance from the legal point of view to put anything upon a highway that was a danger to "persons, cattle, or other animals lawfully using such highway." It was quite immaterial whether the person who put it there knew or did not know whether it was dangerous or not. The defendant had no right to the highway at all for his private purposes, and he had no right to put the trimmings from his hedge upon it, whether they were poisonous or not. To do so was to be guilty of a nuisance, and one which caused loss to the plaintiff. The

result of the case was judgment for the amount claimed—seven pounds. This decision, although anything but novel, is important, for it shows two things: First, that no person has a right to use a highway for a private purpose as apart from a right of way; and that, secondly, a person who disposes of dangerous material in such a way as to cause injury to the cattle of another must be held liable for any loss. There were two distinct wrongs in the case: misuse of the road and negligence resulting in damage.

The law as to poisonous trees and noxious herbs is not by any means as simple as might be understood by any who merely examined it in a casual manner. There is a very great difference between the position of a landlord and a neighbour in such a matter. The law does not regard the landlord as warranting his land to be free from such dangers. That means that the mere letting does not amount to such a warranty; and there cannot be any liability unless there is a definite and distinct warranty, which, as it relates to land, must be in writing, or it cannot be binding. On the other hand, a neighbour may very easily render himself liable in damages.

Perhaps the best known case is one where a company owning a cemetery had planted yew trees for ornamental purposes, and had allowed them to grow over or through the boundary fences. They were eaten by the cattle of a neighbouring farmer, and it was held that he was entitled to recover damages on the ground that the tenant was not bound to examine the boundaries of his farm to see if his neighbours allowed any dangerous trees to grow over his land. It is more than probable that the judges regarded this overgrowth as a sort of trespass, which would, of course, carry damages for all consequences reasonably resulting therefrom. It is somewhat strange, but, all the same, it is a fact, that many people do not seem to be aware of the dangerous results of cattle eating yew tree clippings. Cases which show this are by no means few. Such a case as this shows how careful a man ought to be in this matter, not only for the safety of his own cattle, but also for the purpose of avoiding the consequences which may legally follow if some other person suffers damage through such negligence. Probably the only way to be safe is to at once burn such clippings; but why should such trees be grown at all upon agricultural land?—*Mark Lane Express.*

CORRESPONDENCE.

Horse-sickness, Purpura Hæmorrhagica, or Anthrax.

Can you please let me know what was the cause of death of my horse; and is there anything I could have given to save him. On Friday afternoon, 1st inst., he came in from the veld, drawing his breath hard but slow, I could notice nothing else on him except a sleepy look. Fearing it was the beginning of horse-sickness I gave him the third of a bottle of paraffine, and put him in the stable.

Next morning the head was very much swollen, especially the upper and lower lips, and the hollows above the eyes were also much swollen. I at once steamed him with gum leaves and kept him in the shade.

The natives were of opinion that it was a snake bite, I therefore gave him a bottle of a plant used here for snake bite; the following day he seemed better and the swelling had gone down, but the breathing was still somewhat bad; the next day he got very bad again and died during the night of 4th inst. I cut him open and could find no cause but the lungs, all the inside seemed sound to me but the former, and they had large white patches all over them, with a peculiar green streak, and the lung was very dark, more than it should have been.

I might state the afternoon before death drops of blood came through his skin in many places but more about the lower jaws; I at once cut him about the lips with a sharp knife, feeling that I could thereby ease the swelling.

I should be glad to know what caused death. Did the paraffine cause inflammation?

ALF. J. KILROE.

Palmerton, Pondoland East, Feb. 7th.

In reply to Mr. Kilroe's inquiry respecting the cause of the death of his horse, it is very difficult, from the brief description, to offer a definite opinion. The early symptoms point to the dikkop form of horse-sickness, but the subsequent oozing of drops of blood through the skin of the swollen parts are symptomatic either of that peculiar disease *Purpura hæmorrhagica*, which frequently follows influenza, or of Anthrax. As no mention is made of enlargement of the spleen, I am inclined to reject the latter.

With respect to the treatment, from the appearance of the lungs I am inclined to the opinion that in dosing the horse some of the medicine passed down the windpipe into the lungs, causing death from acute Broncho-pneumonia. But it is impossible to give a definite opinion of the disease or its proper treatment.

D. HUTCHEON, C.V.S.

Ribwort Plantain. Gall Bladders.

I should like to know the name of the enclosed plant. There were a few plants of it came up amongst some lucerne sown amongst some apple trees, and it has now spread all over the patch and stock are very fond of it.

Also ask Mr. Hutcheon where to find the gall in a horse. It is not on the liver; some say it is in the head. Also where to look for the gall of a duiker; I have been told it is under the eyes.

JOE CARLIN.

Cala, Feb. 10th.

The plant submitted is not a grass. It is *Plantago lanceolata L*, the Ribwort Plantain. Many years ago a fashion set in of adding ribwort seed to the mixed grasses laid down to form a meadow. It has proved itself almost an unmixed evil, for it has very little nutritive value and crowds out the much more useful constituents. Nobody thinks of

cultivating it now. It occurs here and there in the Colony, and has been sown by experimenters who have read its praises in early agricultural books of, say, 1815 to 1830. There is, or was, a lot of it on the grassy plateau of the Boschberg, growing socially and elbowing out the grass. Of course stock will eat it when hungry, and when other fodders fall short, but it is far from being a desirable plant. P.M.O.

In reply to Mr. Carlin's question where to find the gall in a horse, the horse has not got a gall bladder, the bile passes direct from the ducts of the liver to the bowel as it is secreted by the liver cells; its secretion may be slightly increased during active digestion, but it flows continuously.

The idea that the gall-bladder of a horse is situated somewhere in his head has originated from observing a peculiar yellow-looking fluid, not unlike bile, flow freely from the nostrils of a horse which is suffering from pulmonary horse-sickness in the last stages. When this frothy serous fluid bursts from the horse's nostrils, I have heard some of the onlookers remark "that the gall had burst in his head." Observing this, and being unable to discover any appearance of a gall-bladder in the vicinity of the liver, and being convinced that a horse, like most other animals, must have a bag for storing up the bile, what more natural than to arrive at the conclusion that this reservoir is situated somewhere in the horse's head.

An ostrich is also without a gall-bladder, and so are some of the antelopes, including the duiker. The glands situate under the eyes in this buck secrete a small quantity of a kind of scent, but it has nothing to do with the gall. Bile is secreted by the liver continuously, but in the majority of our domestic animals there is a considerable interval between the periods of the active digestion of the food, hence a gall-bladder is provided for storing up the bile during this interval in order that it can be poured out in greater quantity when digestion recommences.

The horse has a small stomach in comparison to the amount of food which he requires, hence digestion goes on very rapidly, and he should be fed frequently. It is the same with the ostrich. Digestion goes on almost continuously in these ravenous feeders, hence there is less need for a reservoir for storing up the bile. This may not be the only reason why such animals are without a gall-bladder. The fact remains, however, that the horse, the ostrich, and certain antelopes are without a gall-bladder. See also *Agric. Journal* vol. iii. p. 2.

D. HUTCHEON, C.V.S.

GOVERNMENT NOTICES.

Distribution of American Vine Cuttings—Season 1901.

The following Government Notice was published in the *Government Gazette* of the 12th instant:—

It is hereby notified for general information that the following are the arrangements made for the distribution of the American Vine Cuttings from the Government Plantations during the Season 1901.

1. All applications must be in writing upon printed forms obtainable from the Civil Commissioner and Field-cornets of the Division, and must be addressed to the local Board of Distribution for the District concerned.

2. Applications must be sent in to the Local Boards (addressed to the care of the Civil Commissioner) not later than the 18th of March, after which date no application can be received.

3. The Local Boards will thereupon allot the Cuttings according to the number estimated to be available, notifying the applicants in due course. Allottees must pay for the Cuttings allotted to them not later than the 18th of May, after which date all Cuttings not paid for shall be considered as not wanted, and shall be forfeited and held to be available for allotment to some other person.

4. The Distribution of Cuttings will commence as soon as possible after the 1st of June. Allottees will receive their Cuttings direct from the Nurseries, and will be advised by post of the dispatch of the same.

5. The Cuttings will be divided into two classes, according to thickness. Cuttings not less than 3-16ths of an inch in thickness and 12 inches long will be charged for at the rate of 10s. per 1,000. Cuttings less than 3-16ths of an inch in diameter will be charged for at the rate of 5s. per 1,000; the apportionment to be left in the hands of the Distributing Officer. All Cuttings will where practicable be delivered in double length.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act. 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.
(Inspector's Signature..
(Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..
(Inspector's signature)..
(Address)..
Date...................

Notice to Fruit-growers.

The Board of Horticulture, having deputed Mr. P. J. Cillie to visit during this season the Western Fruit Districts, with a view to framing a list of varieties suitable for cultivation in the different parts, hereby invite the assistance and co-operation of fruit-growers by affording Mr. Cillie every facility and supplying him with the desired information.

C. MAYER, Acting Secretary.

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Show Fixtures.

Indwe Native Agricultural Society, March 1901
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		4 15 0	to	5 6 0
LINSEED CAKES.				
London made	ex mill	8 7 6	,,	8 10 0
American, in bags	ex dock	7 11 3	,,	7 12 6
Russian, in bags	,,	8 0 0	,,	8 5 0
Russian, in mats	,,	7 16 3	,,	7 17 6
COTTONSEED CAKES.				
London made	ex mill	5 0 0	,,	5 2 6
Egyptian, in bags	ex dock	4 15 0	,,	4 16 3
Decorticated	,,	6 12 6	,,	6 15 0
Meal	,,	6 10 0	,,	—
RAPE CAKES.				
East Indian Seed	ex mill	4 12 6	,,	—
Ravison	,,	4 10 0	,,	—
MAIZE.				
Germ Meal (American)	ex dock	5 6 3	,,	5 7 6
,, ,, ,, Jan.-Feb. seaboard shipment		5 5 0	,,	—
,, ,, (English)	ex mill	5 8 9	,,	5 10 0
RICE MEAL.				
Rangoon	ex dock	4 8 9	,,	4 10 0
Locust Beans, Cyprus		5 6 0	,,	5 12 0
MANURES.				
Nitrate of Soda		—		8 10 0
Bone Meal		3 7 0	,,	4 10 0
Kainit		2 7 0	,,	2 15 0
Basic Slag		1 11 0	,,	2 0 0
Superphosphate, 36 per cent.		2 5 0	,,	3 3 0

Mark Lane Express, Jan. 21st, 1901.

AMERICAN PRICES per ton of 2,000 lb.

	£ s. d.
Bran, best quality, per ton 2,000 lb.	3 18 0
Linseed Cake ,,	5 19 0
Cottonseed Cake Meal, per ton 2,000 lb.	5 4 2
Mealies, per bushel 60 lb.	0 2 0
,, per muid 200 lb.	0 6 8
Barley ,, 50 lb.	0 2 1
MANURES—	
Ground Bones, per ton 2,000 lb	4 10 0
Kainit, best quality ,,	1 15 0
Nitrate of Soda, per 100 lb.	0 8 6
Florida High Grade Phosphate Rock	1 18 0

New York Journal of Commerce, Jan 21st, 1901.

London Wool Sales.

LONDON, Tuesday, Jan. 15.—The first series of public sales of Colonial wool for the current year commenced this evening, three catalogues being brought forward, which jointly totalled 7,826 bales, out of an available total of 339,000 bales, and comprised 3,260 New South Wales and Queensland, 965 Victorian, 603 South Australian, 641 West Australian, 8 Tasmanian, 1,881 New Zealand, and 216 Cape. As at present arranged, the series will terminate on the 13th proximo. With a large assembly of buyers present from all quarters, competition was exceedingly active, and prices for merinoes and fine crossbreds ruled 5 to 7½ per cent. over rates current at the close of sales in November last. A not very representative quantity of South African produce sold readily at 5 to 7½ per cent. advance. The total net available quantity amounts to 337,000 bales, comprising 95,340 New South Wales, 46,550 Queensland, 52,100 Victorian, 1,333 Tasmanian, 25,802 South Australian, 7,359 West Australian, 70,393 New Zealand, and 38,123 Cape and Natal. A consignment of New South Wales scoured combing, marked M B diamond over Nepean, sold 1s. 1d. to 1s. 5d.; lambs, 6d. to 10d.; greasy combing, M U M, 7¾d. to 10d.; broken, 7¼d. Queensland—scoured combing Cassillis, 1s. 3½d. to 1s. 4d.; greasy fleece, Mount Abundance, 5¾d. to 8d.; pieces, 6¼d. to 6½d.; bellies, 5½d. to 6¼d. South Australian greasy combing, Kulmine, 7½d.; lambs, 4¾d. to 6d.—HELMUTH SCHWARTZE AND CO. —*Mark Lane Express.*

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

The first of the series for the year 1901 began on January 15th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

CAPE. January 15.

Tantallon, Dunottar.

(NEW CLIP.)

Mark.	Description & Ship.	Bales.	s.	d.
PE/Caledon	Grs.sup.com ..	11	0	7½
	,, lks.	3	0	3¼
J.S. duT. ,,	Flc. wsh.sup.com	46	0	10
	,, ,, pcs. ..	2	0	5¾
HB ,,	,, ,, sup.com	35	0	10
	,, ,, lks. ..	2	0	6
JMM ,,	,, ,, sup.com	10	0	10
	,, ,, lks. ..	1	0	6

Dunottar, Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
LW	sup.sn.wt. ..	9	1	6
	,, ,, ..	1	1	3½
EM	,, ,, ext. ..	10	1	4½
	,, ,, ..	1	1	1½
CJM/KG	Grs.sup.com. ..	12	0	5
	,, ,, ,, ..	43	0	4¾

Tantallon, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms M.	sup.sn.-wt. ..	25	1	2½
	,, ,, ext. ..	14	1	2½
	,, ,, ,, ..	14	1	2
	,, ,, ,, ..	6	1	1½

EAST LONDON.

Admiral, Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
MW/DB	Grs.	9	0	4¾
	,, ...	13	0	4¼
	,, dam ...	1	0	4
TD/DB	Grs com. ...	1	0	5¾
	,, ,, ..	12	0	4¾
	,, pcs. ...	1	0	4¾
HS. ,,	Grs.com ...	4	0	4½
	,, mix ...	1	0	3¾

A. Podeus, Kanzler.

Mark.	Description & Ship.	Bales.	s.	d.
HS/DB	Grs.	2	0	4
	Mix.	2	0	3¾
WA ,,	Grs.sup	1	0	5½
	,, ...	2	0	4¼

CAPE.

Dunottar, Goth, Carisbrook, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
KOP Caledon (New Clip)	Grs.ext.sup.com...	8	0	7¼
	,, ,, ,, ,, ...	8	0	7
	,, ,, ,, ,, ...	9	0	6¾
	,, ,, ,, ,, ...	8	0	6½
LOT ,, ,,	.. ,, ,, ,, ,, ..	16	0	6¾
Waverley Ms [O]	ext.sup.sn.-wt ..	6	1	6
	,, ,, ,, ..	1	1	3¼

Briton, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl, WP&Co/L	Scd.SW.ext. sup.	12	1	4½
,, S	.. ,, ,, ...	1	1	2
,, C	... ,, C C ..	1	0	8½
,, L	.. ,, sn.-wt.ext.sup	8	1	3½
,, S	... ,, ,, ...	1	1	1½
,, L	.. Scd.sup.SW.ext.	8	1	4½
,, S	.. ,, ,, ..	1	1	1½
,, CC	.. ,, C C ..	1	0	9

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl, WP&Co/C	Scd.ext.sup.SW ..	10	1	5
,, S	.. ,, ..	1	1	1½
,,	.. ,, ext.sup ...	4	1	2
OR&MG/L	... ,, ,, ,, ...	17	1	4
,, ,, S	... ,, ...	1	1	1½

Saxon, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl, WP&Co./L	Scd.sn.-wt.ext.sup	15	1	4½
,, S	,, ,, ...	3	1	1½
	,, ,, ...	4	1	2
,, C&C..	,, C C ...	2	0	8½
,, L	...Scd.sn.-wt.ext.sup	8	1	4
,, S	... ,, ,, ...	1	1	1
,,	... ,, ext.sup. ..	4	1	3
,, S	... ,, ,, ,, ...	1	1	1

CAPE. January 16.

Tantallon, Moor, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
MB&Co. Super West. (New Clip)	Grs.sup.com ...	14	0	7¼
	,, ,, ,, ..	15	0	7
	,, ,, ,, ..	18	0	6½
	,, ,, ,, ..	14	0	6½
	,, ,, ,, ...	9	0	6¾
	,, ,, ,, ...	12	0	6¼
Paarl [X]	sup.sn.-wt.ext ...	9	1	5
	,, ,, ,, ..	2	1	3½
	,, ,, ,, ..	2	1	2½
Waverley Ms /F.	,, ,, ,, ...	2	1	4
,, [W]	,, ,, ,, ..	5	1	5½
	Scd.	1	1	2
Paarl [W]	...sup.sn.-wt.ext ..	5	1	5
,, S	,, ,, ,, ...	16	1	5½
	,, ,, ,, ...	21	1	5
	sn.-wt	4	1	4
	Scd.	1	1	1
,, WQ	sn.-wt.ext.sup. ..	28	1	6
	,, ...	1	1	3½
	Scd.	1	1	1
,, [W]	... ,, ...	1	1	0

Braemar, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
HV&Co. MB (New Clip)	Grs.com.sup ..	62	0	6¾
	,, ,, ...	16	0	7
	,, lks.	3	0	3¼
HVH (New Clip)	Grs.com.sup.	20or21	0	7½
	,, ,, ,, ...	20	0	7¼
	,, ,, ,, ..	18	0	6¾
	,, ,, ...	25	0	7
	,, ,, ...	24or25	0	6¾
	,, ,, ...	29or30	0	7
	,, ,, ...	7	0	6¾

Mark.	Description & Ship.	Bales.	s.	d.
LRD (New Clip)	Grs.com.sup.	34or35	0	7½
	,, ,, ...	20	0	7
	,, ,, ...	9	0	7¼
	,, lks.	6	0	3¾
RF	Grs.sup.com.	17or18	0	5¾
	,, ,, ,, ..	34	0	5½
	,, ,, ,, ...	44	0	5¼
OB	,, ,, ,, ...	20	0	5½
	,, ,, ,,	13or14	notsold	
	,, ,, ,, ..	25	0	5¼
	,, ,, ,, ..	42	notsold	
	,, ,, ..	12	0	5¼

Carisbrook, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
HL&Co.	sup.sn.-wt.ext. ...	24	1	2½
98 in triangle	,, ,, ,, ..	5	1	1
do. 99 in triangle	,, ,, ,, ...	3	1	0½
2 in triangle HL&Co.	,, ,, ,, ..	18	1	2½
1 in triangle HL&Co.	,, ,, ,, ..	11	1	2½
AJ B	Grs.sup.	20	0	5½
	,, ,, ...	16	0	5
	,, ,, ...	20	0	4¾

ALGOA BAY.

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
L	sup.sn.-wt. ..	8	1	2½
	,, ,, ..	12	1	2
	,, ,, ..	2	1	1

Carisbrook, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
S	sup.sn.-wt. ..	6	1	2½
	Scd.sup.grey ...	1	0	7½
S in circle	,, ,, crse.wt....	4	0	11½
	,, ,, ,, ,, ..	3	0	9½
	,, ,, grey ...	5	0	9½
	,, ,, ,, ..	2	0	7¼
	,, ,, ,, ...	3	notsold	
	,, ,, blk ..	1	1	1
	Hair	2	0	1½
Various	Grs.	1	0	5½
	,, ...	2	0	5¾
	,, ...	2	0	5½
	Handwashed ..	1	0	5

Norman.

EAST LONDON.

Mark.	Description & Ship.	Bales.	s.	d.
FSS	Scd.sup	9	1	0
	,, ,, ...	14	0	11½
	,, ,, ...	2	1	0
G/LM.	...Grs.dam	7	0	5½
AW	... ,, ,, ...	1	0	5
n/m	... ,, sup.com ...	1	0	5

Briton, Dunottar, Guelph, &c.

Mark.	Description & Ship.	Bales.	s.	d.
IVY	Grs.sup.	12or13	0	7
	,, ,,	15	0	6½
	,, ,,	3	0	6
S	,, ,, com.	13	0	7
KNS	sup-sn.-wt.	12	notsold	
J<B>M	Grs.sup.	8	0	6¼
E(B)L	,, ,,	22	notsold	
BLD	,, ,,	7	0	6
	,, ,,	7	0	5¾
	,, ,,	4	0	5½

CAPE. January 17

Kinfauns, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
SIM H	Grs. sup. com. ext.	13	0	6¾
	,, ,, ,,	23	0	6½
	,, ,,	4	0	6¾
SJB/H	,, ,, com.	6	0	5½
,, D	,, ,, ,,	11	0	5½
,, JB	,, ,, ,,	22	0	6
MAR S	,, ,, ,,	13	0	5½
	,, ,,	11	0	5¾
	,, ,,	1	0	4¼

Scot, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
AJ B	Grs.com	20	0	5¼
	,, ,,	17	0	5
	,, sup.	46	0	4¾
SAS	,, ,,	16	0	5
	,, C C	1	0	3¾
	mohair	6	0	10

ALGOA BAY.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
□	sup.sn.-wt.ext	33	1	2½

EAST LONDON.

Tintagel. Scot, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
S	Grs.	51	notsold	
MER	Grs.sup.	7	0	6½
	,, ,,	11	0	6¼
	,, ,,	6	0	5¾
TTT	,, ,,	11	0	6¼
	,, ,,	11	0	6
GJ	,, ,, com.	21	notsold	
,, &c.	,, ,, ,,	23	notsold	
	,, skt	6	0	4
IVY	Grs.sup.	46	notsold	
	,, ,, lam.	12	0	6½
Various		55	notsold	

Carisbrook Castle.

Mark.	Description & Ship.	Bales.	s.	d.
KRD.	Grs.sup.	8	notsold	
	,, ,,	7	0	6¼

Tantallon Castle, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
Baza.	Scd.sup	41	1	2
	,, ,,	25	1	1½
	,, ,,	43	1	2
	,, ,,	20	1	1½
L&P	Scd.sup.	4	1	1½
	,, ,,	1	notsold	

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
B	Scd.sup.	33	1	2½
FW	Flc.wsh.sup	34	0	7¼

Gaul.

Mark.	Description & Ship.	Bales.	s.	d.
MB	Grs.sup.com.	136	0	5¾
	,, ,, ,,	28	0	5¼
	,, ,, light	32	0	5¾
	,, ,, ,,	33	0	5½
	,, ,, dam	1	0	4½
S/MB/U	,, ,,	7	0	6¼
	,, ,,	4	0	5¾
L/MB/U	,, com.	3	0	6¼
	,, lam	4	0	6½

Tantallon, Carisbrook, Garth, Dunottar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo.	Scd sup	36	1	1½
	,, ,,	35	1	1
	,, ,,	61	1	2
	,, ,,	16	1	2
Yukon	Scd.sup.	56	1	1
	,, ,,	1	0	8½
	,,	2	0	8
	,, sup.	9	1	1
	,, ,,	15	1	0½
	,, ,,	10	1	1
	,, ,,	25	1	1½
Bomvana	Scd.sup	1	0	10
	,, ,,	4	1	1
L&P	,, ,,	1	0	11½

CAPE.

Moor, Dunvegan, Briton, &c.

Mark.	Description & Ship.	Bales.	s.	d.
GJM	Grs mix.blk	1	0	2
Paarl [APL]	Scd.sn.-wt.ext.sup	9	1	5
	,, ,,	1	1	2
,, HD	,, ,, ext.sup	20	1	2½
Waverley Ms [M]	,, ,, ,, ,,	16	1	3½
CJM RK	Grs.sup.	8	0	5½
	,, ,,	5	0	5¼
	,, ,,	55	notsold	

Mark.	Description & Ship.	Bales.	s.	d.
CAPE.		January 18		
	Norman.			
Y	Grs.com. ..	.. 10	0	6¼
	,, ,, ..	.. 31	0	5½
M	.. ,, ,, ..	.. 2	0	5¾
JE&N	..sn.-wt. ..	.. 4	1	0
W	.. ,, ..	.. 1	0	10
BLK	..Scd.blk ..	.. 1	1	2
	Briton.			
JE&N	Grs.lam ..	.. 14	0	5¾
	,, ,, ..	.. 1	0	6½
	Carisbrook.			
88 in triangle HL&Co	sup.sn.-wt.ext ..	5	1	3
87 do. do.	,, ,, ,,	.. 35	1	2
	,, ,,	.. 1 notsold		
Six Birds in inverted triangle	Flc.wsh.sup	.. 23	0	7½
	,, ,, ,,	.. 22	0	7¼
	Moor.			
Wolseley [HE]	sup sn.-wt.ext.west	15	1	5½
	Dunvegan.			
Waverley Ms [M]	sup.sn.-wt.ext...	21	1	3
	,, ,, ,, ..	15	1	2½
	,, ,, ,, ..	5	1	2
	sn.-wt. ..	.. 2	1	1
	Norman.			
Waverley Mills M	sn.-wt ext.sup. ..	1	1	3
	,, ,, ,, ..	.. 6	1	2½
	,, ..	.. 3	0	11½
	,, ..	.. 1 notsold		
	,, ..	.. 1	0	6½
	Scd. coarse	.. 2	0	7¾
	,, grey ..	.. 2	0	9½
	,, ...	.. 2	0	2¼
	,, ..	.. 1	0	5¾
JDL	Grs.sup.com.	.. 37	0	6¼
	,, pcs. ..	.. 2	0	2¾
	mix. ..	.. 1	0	3¼
CJM/Z/BL	Grs.sup.com	.. 9	0	6¾
	,, ,, ,,	.. 14	0	6½
	Dunottar.			
Paarl. SE	sn.-wt.ext.sup.	.. 4	1	5
	,, sup...	... 14 notsold		
	,, ..	... 1	1	2
	,, ..	.. 1	0	11½
,, [RO]	.. ,, ext.sup.	.. 17	1	3½
	Goth.			
TLT (Special Clip)	Grs.sup.com.	... 26	0	7½
	,, ,, ,,	.. 18	0	7

Mark.	Description & Ship.	Bales.	s.	d.
	Dunvegan.			
AE	Grs.com. ..	.. 15	0	6½
	,, sup. ..	.. 3	0	6¼
	,, pcs. ..	.. 2	0	4
BB	,, com...	.. 13	0	5
	,, sup. ...	... 7	0	4¾
	,, pcs. ..	.. 1	0	2¾
ALGOA BAY.				
	Scot.			
[G]	..sn.-wt.ext.sup. ..	26	1	2½
EAST LONDON.				
	Norman, Dunottar.			
E	sup.sn.-wt.	.. 46	1	2½
crossed swords	,, ,,	... 80	1	2
L	,, ,,	.. 8	1	1½
	Tantallon.			
EL 6 Birds in rev. triangle	Flc.wsh.sup.	.. 37	0	6¾
do. do. TM.	.. ,, ,, ,,	.. 28	0	7
do. do. do.	.. ,, ,, ,,	.. 17 notsold		
	Scot.			
GOT	Grs.sup. ..	.. 16 notsold		
	,, ,, dam	.. 1	0	4¾
PIP	,, ,, ..	.. 6	0	6¼
	,, ,, ..	.. 11	0	5¾
OSF	.. ,, ,, ..	.. 6	0	6½
,, GW	,, ,, ..	.. 2	0	6½
	,, lam ..	.. 2	0	6½
,, HGK	.. ,, ,, ..	.. 2	0	6½
,, FWW	.. ,, ,, ...	.. 1	0	6¼
,, CP	.. ,, sup. ..	.. 5	0	5¼
	Briton, Arundel.			
XL	Grs.sup.com.	.. 5 notsold		
	,, ,, ,,	.. 19	0	6¾
	,, ,, ,,	.. 20 notsold		
WAR	,, ,, ..	.. 7 notsold		
	,, ,, ..	.. 5	0	5¾
	,, ,, ..	... 11 notsold		
	Dunvegan.			
ROS	..Grs.sup.com.	... 25	0	6¼
	Mexican.			
KRD	Grs.sup. ..	.. 37	0	6¼
	,, ,, ..	.. 4	0	6
	Carisbrook, Scot.			
	Grs.sup. ..	.. 10	0	6¾
	,, ,, ..	.. 9 notsold		
	,, ,, ..	.. 12	0	6¼
	,, ,, skt.	.. 1	0	3¾

Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
BOR	Grs.ext.sup.com.	35	notsold	
	,, ,, ,, ,, ...	10	0	6¼

Gaika, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Anchor	Flc.wsh.sup. ..	25	0	7½
	,, ,, ,, ..	25	0	7¼
	,, ,, ,, ..	54	0	7
A.Nell	...Grs.sup.com. ..	12	0	7¼
E (B) L	,, ,, ...	5	0	6½
	,, ,, ...	1	notsold	

Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
I <V> Y	Grs.sup.com. ..	10	0	6¾
	,, ,, ...	31	0	6¼
	,, ,, ...	7	notsold	

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
W.H.James Mt.Hone	Grs.ext.sup.com. skt.	35	notsold	
H	... ,, ,, ,, ,, ,,	21	notsold	
,, W.H.Price Mt.Hone	,, skt.	4	0	3¾

Dunvegan, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
B A L 21	sn.-wt.	70	1	0
	,, ...	35	0	11½
	,, ...	10	1	0½
	,, ...	83	0	11½
AGO	...Scd.sup.blk. ...	12	1	3½

Briton.
(ALL NEW CLIP)

Mark.	Description & Ship.	Bales.	s.	d.
Gray	Grs.sup.	16	0	7
	,, ,, ...	2	0	5
W.A.Edmonds Ewanrigg Kei Mouth	,, ,, ...	16	0	7
ONJK	... ,, com.	19	0	5¼
PEJ	,, ,, ...	41	0	5¼
	,, ,, dam ...	4	0	5¼

Dunottar, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
FM<AEB>FG	..Grs.sup. ...	19	0	6¾
RM ,,	,, .. ,, ,, ...	3	0	5½
NIX	..Flc.wsh.sup. ...	20	0	7¼
G in Double Triangle	Grs.sup.	13	0	6¾
F do. do.	... ,, ,, ...	11	0	5¾
E do. do.	... ,, ,, ...	23	0	6½
A do. do.	... ,, ,, ...	5	0	6¼
AWR	,, ,, ...	22	0	5¾
	,, ,, ...	11	0	6
FSS	...Scd.sup.	30	1	0
<JGD>	Grs.sup.	48	notsold	
	,, ,, ...	26	0	5¼
AS	..sn.-wt.sup. ...	42	1	2
JJS	.. ,, ,, ...	54	1	2
NDD	..Grs.com.... ...	1	0	4

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
B A L 21	sn.-wt.	35	1	1½
	,, ...	18	1	0½
	,, ...	6	0	11½

Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
WA/DB	..Grs.com...	4 or 5	notsold	

CAPE. January 19

Goth.

Mark.	Description & Ship.	Bales.	s.	d.
W.W.Fynn	Grs.	13	notsold	
	,, lam	2	0	7

Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
Wolseley [V&Co.]	sup sn.-wt. ..	11	1	2¼
	,, ,, ..	1	notsold	
	,, ,, ..	1	0	11½

ALGOA BAY.

Scot, Tantallon, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
WS	sup.sn.-wt ext ...	6	1	1¼
	,, ,, ,, ..	10	notsold	
	Grs.sup.com. ..	8	0	6¾
GB	.. ,, ,, lam ..	7	0	5½
CCC	..sup.sn.-wt ...	9	notsold	
DAL	.. ,, ,, ext ..	2	1	1½

Gaika, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
SPL	Grs.sup.long.com.	13	0	6¼
	,, ,, ,, ,,	24	notsold	
	,, ,, ,, ,,	13	0	7½
	,, ,, ,, ,,	26	0	5½
	,, ,, ,, ,,	9	notsold	
13 in triangle HL&Co.	sup.sn.-wt.ext. ..	30	1	2
	,, ,, ,, ..	2	0	11

EAST LONDON.

Briton, Gaul, Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
GEM	Grs.com.sup. ...	14	notsold	
	,, ,, ,, dam	1	0	6¼
JMD	.. ,, sup.	31	notsold	
MMS	.. ,, sup.	15	notsold	
AH	.. ,, ,, ...	10	0	5½
TMP	Grs.sup.	48	0	6¼
	,, ,, ..	18or19	0	6¼
	,, ,, ...	1	0	4¾
GEC	,, ,, ...	7	0	6¼
SGN	,, ,, blue ..	32	notsold	

Carisbrook, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Baza	Scd.sup ..	32	1	1½
	,, ,, ..	33	1	1
L&P	.. ,, ,, ..	5	1	1½
Crossed Arrows	.. sup. F W	30	0	7¼
XSQ	Grs.ext.sup.com..	13	0	6¼
	,, ,, ,, ,, ..	25	notsold	
	,, ,, ,, ,, ..	22	0	6¼
XCB	.. ,, ,, ,, ,, ..	45	notsold	

CAPE. January 21.

Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/ OR&MG	Scd.ext.sup. S W	20	1	3½
,, S	.. ,, ..	1	1	1½
,, CC	.. ,, C C	1	0	3½
,, OR&MG	,, ext.sup. S W	9	1	9½
	,, ..	1	1	0
,, ,, L	... ,, ext.sup. S W	9	1	4
,, S	.. ,, ..	1	1	1
,, OR&MG	.. Scd.ext.sup S W	7	1	3½
,, ,, S	.. ,, ..	1	1	0½
WP&Co ,, ,, ,,	,, ext.sup. S W	20	1	3⅛
	,, ..	1	0	9½
,, Paarl/W	,, ext.sup. S W	7	1	2½
	,, ..	1	1	1

Moor, Braemar, Goth.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl /OR&MG/C	Scd.ext.sup SW	6	1	5
,, ,, S	.. ,, ...	1	1	2½
,, WP&Co/W	... ,, ext.sup. SW	2	1	2½
,, ,, S	... Scd. ..	1	1	1½
,, OR&MG/G	.. ,, ext.sup. S W	8	1	3¼
,, ,, S	.. ,, ..	1	1	1
,, ,, CC	.. ,, ..	1	0	9½
,, WP&Co OR&MG/G	Scd ext.sup.sn.-wt	12	1	3½
,, ,, S	.. ,, ..	1	1	1½
,, ,, CC	.. ,, C C ..	1	0	9
,, WR&Co/W	Scd.sup.sn.-wt. ..	5	1	2½
	,, ...	1	1	0½

Moor, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
BBB	Grs.sup.com ..	48	0	7¼
	,, ,, ,, ..	16	0	7
	,, ,, ,, ..	10	0	6¾
	,, ,, ,, ..	59	0	6½
AGW	.. Grs.sup.com	103	0	7

Dunvegan, Kinfauns, Norman, &c.

Mark.	Description & Ship.	Bales.	s.	d.
L&B S	wsh. ..	15	0	9½
	Grs. ..	12	0	7
	,, ..	39	0	6¾
	,, ..	18	0	6½
	,, ..	6	0	6¼
	,, ..	3	0	5½
	,, lks. ..	2	0	3¼
	,, ,, ..	1	0	3½
	,, ,, ..	1	0	3¾
,, ,, AM	Grs. ..	5	0	7
	,, ..	4	0	6½

Carisbrook, Briton, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
L&B/S/PM	Grs. ..	16	0	7
	,, lks. ..	2	0	4¼
,, ,, MG	Grs. ..	6	0	5¾
	,, lks. ...	1	0	3
,, IG	.. ,, ..	11	0	7
,, S/VV	.. ,, ...	7	0	6½

CAPE. January 22

Dunottar, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
WTC	... Grs.sup. ...	5	0	5¼
<H> R	... ,, blk. ...	6	0	4¼

ALGOA BAY.

Norman, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
DRY	Sn -wt.sup.	15	1	1¼
	,, ,,	3	notsold	
	,, ,,	4	1	2
	,, ,,	3	notsold	
	,, ,,	5	1	1½
	,, ,,	5	1	0¼
	,, ,,	1	notsold	

EAST LONDON.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
Kaffrarian M in rev. triangle F G	Grs.sup.com.	17	0	7
	,, ,, ..	16	0	6¾
	,, ,, ..	42	0	6½
	,, ,, ..	22	0	6¼
	,, ,, ..	20	0	6
SEL	.. Scd. ..	1	0	7¼

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
ROY	.. Grs.sup.com.	25	0	5¼
VOV	,, ,, ,,	16	0	5¾
	,, ,, ...	10	0	5½
	,, ,, ...	1	0	4¾
BOY	,, ,, com.	5	0	5¼
	,, ,, ...	19	0	5

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Kaffrarian C in rev. triangle	Grs.sup.com...	38	0	6
	,, ,, ..	5	0	6

CAPE. January 22.

Avondale.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl[DM] &c.	sn.-wt.ext.sup. ..	11	1	5½
	,, ,, ,, ..	11	1	4½
	,, ,, ,, ..	3	1	3
	,, ,, ,, ...	1	1	3
,, RA	,, sup. ..	2	not sold	
	,, ,, ...	1	0	10½
,, ST	Scd. coarse whi e	1	0	10
	,, grey ..	1	0	9½
Wolseley [DE]	sn.-wt.ext.sup.	10	1	4½
,, [TH]	,, ,, ,,	9	1	4½
,, [AM]	,, ,, ,,	6	1	3½
&c.	,, sup. ..	3	1	1½

Pembroke.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/B	...sn.-wt.ext.sup. ...	8	1	5½
,, R	.. ,, ,, ,, ..	9	1	5
,, X	,, ...	4	1	3½
	Scd.	1	1	1
,, [W]	ext.sup.sn.-wt. ...	1	not sold	
	,, ,, ,, ..	3	1	0
,, JP	sn.-wt.ext.sup. ..	11	1	5
	,, ...	1	1	2
WaverleyMills	,, ext.sup. ..	12	1	4½
,, D	,, ,, ,, ...	2	1	3

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl <S>	sn.-wt.ext.sup. ..	22	1	5
	,, ...	4	not sold	
	Scd.	2	not sold	

Tantallon, Moor, Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
AAA (New Clip)	Grs.sup.com. ..	6	0	7
	,, ,, ,, ...	30	0	7¼
	,, ,, ,, ..	24	not sold	
	,, ,, ,, ..	28	0	7
	,, ,, ,, ..	15	0	6¾
MB&Co. (New Clip)	,, ,, ,, ..	25	0	7¼
	,, ,, ,, ..	21	0	6¾
	,, ,, ,, ..	8	0	6½
	,, ,, ,, ...	13	0	7
	,, ,, ,, ..	18	0	6¾
	,, ,, ,, ..	21	0	6½
	,, ,, ,, ..	11	0	6¼
	,, ,, ,, ..	13	0	6½
	,, ,, ,, ..	11	0	6¼
	,, ,, lam. ..	1	0	7
	,, blk. ..	3	0	4
	,, coarse ..	1	0	4
	,, lks. ..	11	0	3¾

Dunvegan, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl [X] &c.	ext.sup.sn.-wt. ..	9	not sold	
	Grs. ,, com. ..	20	0	6
JTR	,, ,, ,,	21 or 22	0	5¾
	,, ,, ,, ..	26	0	5½
	,, ,, ,, ..	17	0	5
	,, ,, ..	6	0	5¼
	,, ,, com. ..	7	0	5¼

Kinfauns, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
LD	Grs.com. ..	17	0	5
	,, sup. ..	5	0	5¼
	,, ...	1	0	4½
DDS/B	..ext.sup.sn.-wt. ..	11	1	1½
(S)	..Scd. ,, grey ..	3	not sold	

ALGOA BAY.

Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
FOT	..Grs.sup.com. ..	67	not sold	

EAST LONDON.

Avondale, Scot, Arundel, &c.

Mark.	Description & Ship.	Bales.	s.	d.
IXL	..Grs.sup.com. ..	25	not sold	
Rowe	.. ,, ,, ,, ..	31	not sold	
SXM	,, ,, ,, ..	13	0	6¼
	,, com. ..	1	not sold	
	,, ,, skt. ..	1	0	4
E(B)L	.. ,, sup. ..	30	not sold	
IVY	,, ,, ..	16	not sold	
	,, ,, ..	19	0	5¾
SLC	,, ,, com. ..	12	not sold	
	,, ,, ,, ..	32	0	6
	,, ,, ,, ..	7	0	6½
KRD	,, ,, lam. ..	4	0	6
	,, ,, ...	21	0	6
	,, ,, ..	8	0	5¾
A	Scd.mix. ..	1	0	5
	sup.sn.-wt. ..	4	1	2
	Grs.sup. ..	24	not sold	
	Flc.wsh.sup. ..	2	0	6¾
EXS	..Grs.sup. ..	24	0	6

CAPE. January 23.

Goth.

Mark.	Description & Ship.	Bales.	s.	d.
Anchor (New Clip)	Grs.sup.com. ..	11	0	7½
	,, ,, ,, ..	29	0	7¼
	,, ,, ,, ..	28	0	6¼
	,, ,, ,, ..	14	not sold	
	,, ,, ,, ..	18	0	6½
	,, ,, ,, ..	8	0	5¾
	,, ,, ,, ..	44	not sold	
	,, breech ..	1	0	3
	,, lks. ..	3	0	2¾
	,, ,, ..	5	0	3¼
Good Anchor Hope	Scd.sup.S.W. ..	3	0	11
	,, ,, ..	1	0	8½
	,, ...	1	0	9
	,, ...	1	0	10
	,, ...	1	0	6¾

EAST LONDON.

Briton, Tantallon, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs.sup.	8	not sold	
	,, ,,	6	0	5¾
	,, ,,	15	not sold	
	,, ,,	14	0	5½
	,, ,,	7	0	6
	,, ,,	9	0	5¾
TTT	,, ,,	11	0	5½
MER	,, ,,	6	0	6
IVY	..Grs.sup.	12	0	6½
S	.. ,, ,,	12	not sold	
TGF/Kinahan	,, ,,	23	not sold	
,, LBS	,, ,, lam.	3	0	6½

Moor, Kinfauns, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
KSW	sn.-wt.sup.	7	1	3
SW	,, ,,	7	1	2½
	,, ,,	10	1	2
A. Shaw	..Grs. ,,	9	0	6¼
JAK	.. ,, ,, xbd	5	0	6
KRD	,, ,,	12	not sold	
	,, ,,	12	0	5¾
	,, ,,	12	0	5½

CAPE. January 24.

Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
FBK	Grs.sup.com.	28	0	5¾
	,, ,, ,,	28	0	5½
	,, ,,	7	0	5
NOL	,, ,,	31	0	5¼
	,, ,,	47	not sold	
LOF	,, ,,	5	0	4¾
	,, ,,	22	0	4½

Dunottar, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
GUM	Grs.com.	12	0	4¼
	,, ,,	5	0	3¾
	,, ,,	1	0	5½
M	sn.-wt.ext.sup.	10	not sold	
S in triangle	,, ,, ,,	4	1	3½
M	,, ,, ,,	4	1	2

EAST LONDON.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
COC	..Grs.sup.com.	11	0	5

Kinfauns, Norman, Scot, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Baza	..Scd.sup.	147	not sold	
Lunda	.. ,, ,,	6	not sold	
L&P	,, ,,	3	not sold	
	,, ,,	4	0	11
	,, ,,	1	0	9½

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
PB	Grs.sup.com.	19	0	5¼
TB	,, ,, ,,	7	0	5
	,, ,, lam.	2	0	5½
PB/WL	.. ,, ,, com.	9	not sold	
,, CJ	.. ,, ,, ,,	13	0	5¼
,, JM	.. ,, ,, ,,	5	not sold	
,, AE	.. ,, ,, ,,	3	not sold	
,, WM	.. ,, ,, ,,	2	0	5¼

Kinfauns, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
DGF	..F W sup.	47	not sold	
XSL	..Grs.sup.	38	not sold	

Tantallon, Moor, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
MER	Grs.sup.	17	0	5¾
	,, ,,	9	0	5¼
	,, ,,	4	not sold	
	,, ,,	6	0	5¼
SLC	.. ,, ,, com.	8	not sold	
KAF	,, ,,	4	0	5½
	,, ,,	8	not sold	
CK	,, ,,	13	not sold	
	,, ,, lam.	3	0	5¾

Scot, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
JH/Ronan	..Grs.sup.	9	0	4¾
C.G.Hay	,, ,, com.	10	0	6
	,, ,, ,,	9	0	5¾
	,, ,,	27	not sold	
BUR	Scd.sup.blk.	7	1	3½
	,, ,, grey	5	0	10
	,, coarse white	4	0	10

Briton, Scot, Gaika, &c.

Mark.	Description & Ship.	Bales.	s.	d.
(KN)	sn.-wt.sup.	3	1	2½
	,, ,,	10	not sold	
Anchor	F W sup.	10	0	7
	,, ,, ,,	22	not sold	
	,, ,, ,,	21	0	6¾
	,, ,, ,,	9	0	6¼
[SS]	.. ,, ,,	4	not sold	
SAY	...Grs.sup.	45	not sold	
RON	... ,, ,,	8	not sold	

Moor, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs.sup.lam.	4	not sold	
	,, ,, ,,	5	0	5¾
	,, ,,	5	not sold	
	,, ,,	4	0	5¼
FH/Tylden	... ,, ,,	10	0	6½

CAPE. January 25.

Dunvegan, Tantallon, Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl TW&Co.	sn.-wt.ext.sup.	2	1	5
	" " "	8	1	5½
	" " "	2	1	4½
	" sup.	17	1	2
	" ...	1	1	4
	" ...	4	0	11½
	" ...	2	0	7½
	Scd.coarse	3	0	9
	" "	7	0	7
	" grey	4	0	8½
	" "	2	not sold	
TW&Co/A	sn.-wt.	1 or 2	0	10
" B	" ...	1	1	1½
	" ...	2	0	11
" L	" ...	4	0	11½
	Scd. ...	4	0	10
" Grassveld	Grs.com.	3	0	5
	" "	4	0	5½
" B	sn.-wt.	2	0	11½
Waverley Ms. TW/C	Scd.coarse	10	0	11½
" " CC	" grey	4 or 5	0	9
" I	" "	2	0	8½

Pembroke, Saxon, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
DMLR Caledon (New Clip)	Flc.wsh.sup.com.	17	0	10½
	" " " "	18	0	9½
	" " lks.	2	0	6¼
MLN (New Clip)	Grs.sup.com.	20	not sold	
	" pcs.	2	0	3¾
CJR Caledon (New Clip)	Flc.wsh.sup.	11	0	9
	" " "	1	not sold	
	" " lks.	1	0	6¼

Tantallon, Raglan, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms. M	sn.-wt.sup.	58	not sold	
	" ..	2	1	2
	" ..	1	0	11½
	" sup.ext.	17	not sold	
	" " "	1	1	3½
	" "	15	not sold	
	" "	1	1	2½
	" "	1	1	1
	" ..	1	not sold	
	Scd.crse.	14	0	10½
	" grey	1	0	9½
	" "	17	0	8½
CJM	Grs.lam.	2	0	5½
Waverley Ms. M	sn.-wt.ext.sup	14	not sold	
	" ..	1	1	0½
	" ..	1	0	7¾
	Scd.crse.	3	0	10½
	" grey	3	0	9
M SL	" ..	7	0	4¼
M/SM	" ..	1	not sold	

ALGOA BAY.

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
JP H H W	sn.-wt.sup.	6	1	1½
	" "	75	1	1
	" "	4	1	0
	" "	28	1	0½
	"	39	0	11½
H<JP/W>W	" sup.	16	1	0
	" "	2	0	11½
JL	sup.sn.-wt.ext.	17	1	3½
GS	" " "	17	1	2½
JV	" " "	12	1	2
JK	" " "	19	1	2½
CB	" " "	11	1	3
<J>	" "	1	1	3
	" "	10	1	1½
	" "	4	1	0½

Kinfauns, Saxon, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
AO	ext.sup.sn.-wt.	20	1	2
OK	" " "	13	1	2½
FH	" " "	16	1	2½
DI	" " "	11	1	3½
JT	" " "	16	1	3½
Various	... ...	44	not sold	

EAST LONDON.

Saxon, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
Toise	sup.sn.-wt.	6	1	1
	" "	1	0	11½
Zulu	" "	43	not sold	
	" "	10	1	0½
	" "	1	0	11½
<B>	" "	20	1	0½
	" "	15	1	0
FBT/HebeHebe	Flc.wsh.sup.	10	0	7

Briton, Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
B L&P	sn.-wt ..	13	not sold	
	Scd.coarse	2	0	9½
	" grey	3	0	10
	" blk.	2	not sold	
ACMcD	Grs.sup.com.	27	not sold	

Carisbrook, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
BAL	Grs.sup.com.	200	not sold	
PW 1900	" com.	6	0	5
SCH "	" "	39	0	5½
	" " dam.	1	0	5¼
BP "	" sup.	20	0	5¼
MG "	" "	5	0	5¾
HR "	" "	13	0	6¼
RCW "	" " com.	1	0	5½
	" "	27	0	6¼
RBA "	" "	11	0	6

Mark.	Description & Ship.	Bales.	s.	d.
	Kinfauns.			
RAG/S	Grs. ..	27	0	4¾
	mix. ..	4	0	4
TG/P	Grs.sup.	9	0	5
	mix. ..	1	0	4¼
	Gaul, Norham.			
RU	Grs.sup.	25	0	5
RW	,, ,,	15	0	4¾
TG/AK	,, ,,	17	not sold	
,, S	,, ,,	23	0	5
Various	.. ..	25	not sold	
	Dunottar, Braemar.			
TG/P	Grs.sup.	6	0	4¾
	,, ,,	5	0	4½
,, DN	,, ,,	14	0	4¾
	,, blk.mix.	1	0	4¼
	mix. ..	1	0	4
, S	Grs.sup.	19	0	4¾
	,, ..	4	0	4¾
	,, mix.	1	0	4
	Dunottar.			
HD/W	Grs.com.	15	0	4¾
MJL	,, ,,	11	not sold	
TP	,, ,,	28 or 30	not sold	
	,, sup.	1	0	4½
RB&Co.	,, ,, com.	59	not sold	
	,, ,, ,,	7	0	4½
	,, ,,	5	not sold	
	,, ,,	5	0	4¾
	,, dam.	2	0	5
	,, sup.com.	6	0	4¾
	,, ,,	29	not sold	
	,, ,,	12	0	4
	,, ,,	6	0	4¼
CT	,, ,, com.	2	0	4¼
	Herzog.			
WA BD	Grs.com.	3 or 4	0	3¾
	,, mix.	1	0	4
	Gaika.			
M in reversed triangle F G	Grs.sup.	19	0	6¼
	,, ,,	14	0	5¾
	,, ,,	10	0	6
TIN	,, ,, com.hgt.	7	0	6
	,, ,, ,,	11	0	6¼
	,, ,, ,,	14	0	5½
	,, ,, ,,	9	0	5¼
JAN	,, ,, ,,	18	0	5
	,, ,, ,,	5	0	5¾
FJW	,, ,,	22	0	4¾
	,, ,,	24	0	4½
	,, ,,	17	0	4¼
	Saxon, Briton, Moor, &c.			
Crossed Swords	sup.sn.-wt.	24	1	2
EL	,, ,, ,,	117	1	1½
	,, ,,	26	1	1
	,, ,,	8	1	0½

Mark.	Description & Ship.	Bales.	s.	d.
EL 6 Birds in rev. triangle	Flc.wsh.sup.	74	0	6½
	Grs.sup.	1	not sold	
,, TM	Flc.wsh.sup.	19	0	6½
,, JD	,, ,, ,,	4	0	7
,, DJH	,, ,, ,,	20	0	6¾
,, PWW	,, ,, ,,	3	0	6¾
MLL	Grs.sup.	6	not sold	
D<O>R	,, ,,	8	0	5
	,, ,,	50	0	4¾
	,, ,,	13	0	4½
6 Birds in rev. triangle FW	Flc.wsh.sup.	63	0	7
BW	Grs.sup.lam.	9	0	5¼

CAPE. January 26.

Mark.	Description & Ship.	Bales.	s.	d.
	Carisbrook.			
R&Co.	Grs.com.	12	0	5
	,, ..	30	0	4
	,, ...	80	not sold	
	,, ..	7	0	4¼
	,, ..	12	0	3¾
W	,, ..	31	0	5
	Saxon.			
MG/FW	fine ..	4	0	5¼
,, CW	coarse ..	4	0	4
	Scd.sn.-wt.	71	not sold	
GWH	,, ,,	18	0	10
	Grs.com.	27	0	5¼
	,, ,,	27	0	5
LTH	,, ,,	61	0	4¾
	,, ,,	60	not sold	
DCT	,, ,,	25	not sold	
CT&S	,, ,,	14	0	5
	,, ,,	5	0	4¾
	,, ,,	46	not sold	
NA	,, ,,	74	0	4¾
	,, ,,	37	0	4½

CAPE. January 28.

Mark.	Description & Ship.	Bales.	s.	d.
	Kinfauns, Dunvegan, Doune, Briton.			
YKS	Grs. ..	29	not sold	
Paarl [HT]	Scd.sn.-wt.sup.ext.	18	not sold	
	,, ,,	1	1	4
	,, C C	1	0	8½
,, CJM	,, sn.-wt.sup	2	1	2½
,, L	,, lks.	3	0	10
,, HD	,, sn.-wt.sup.ext.	40	not sold	
,, S	,, ,, ,,	1	1	0
,, L	,, ,, ,, ext.	7	1	1½
,, B&c.	,, ,, ,, ,,	14	not sold	
,, CC	,, C C	1	0	8

Mark.	Description & Ship.	Bales.	s.	d.
Dunvegan, Moor, Norman.				
Waverley/ RPR	Scd.sn.-wt.ext.sup.	24	not sold	
CJM/RP	Grs.sup. ..	5	0	5¾
	,, ,, ..	10	0	5½
	,, ,, ..	6	0	5¼
,, KG	.. ,, ,, ..	8	0	5
YKS	.. ,, com.ext. ..	12	0	5
Scot, Tintagel.				
AJB	Grs.sup.com ..	19	0	5
	,, ,, ..	57	not sold	
C HUM	Grs.sup.com.ext.	21	0	6½
	,, ,, ,, ..	16	0	5½
	,, ,, ,, ..	15	0	5¼
	,, ,, ,, ..	10	not sold	
CAP	,, ,, ..	18	0	5¾
	,, ,, ..	11	0	5¼
	,, ,, ..	7	0	5
MEL	Flc.wsh.sup. ..	37	0	6

EAST LONDON.

Mark.	Description & Ship.	Bales.	s.	d.
Tantallon.				
Bolo	Scd.sup. ..	98	1	0
	,, ,, ..	38	0	11½
	,, ,, ..	2	0	11
Yukon	,, ,, ..	9	1	0
	,, ,, ..	33	0	11
	,, ,, ..	5	0	10
FF/Dell	Grs... ..	17	0	5
Dunvegan.				
CH	Grs.sup.com. ..	23	0	5¼
	,, ,, ,, ..	31	0	5
	,, ,, ,, ..	19	not sold	
DJH	,, ,, ,, ..	18	0	5¼
	,, ,, ,, ..	29	0	5
PME	Grs.sup.com. ..	35	0	5½
MB T	,, ,, ,, ..	15	not sold	
	,, ,, ..	22	0	4½
	,, ,, ..	15	not sold	
GME	Grs.sup.com. ..	13	not sold	
	,, ,, ,, dam	1	0	4½
	,, ,, ..	7	0	5
ZDB	,, ,, com. ..	17	0	5¼
TA	,, ,, ,, ..	15	0	5
WP	,, ,, ,, ..	12	0	4¾
PWH	,, ,, ,, ..	11	0	5
RP	,, ,, ,, ..	9	0	4¾
DWH	,, ,, ,, ..	9	0	4½
HCM	Grs.sup.com. ..	7	0	4¾
	,, ,, ..	2	0	4½
PRVH	,, ,, com. ..	11	0	5
JJH	,, ,, ,, ..	8	0	5
NDB	,, ,, ,, ..	6	0	5
CE	Grs.sup.com. ..	3	0	5
CVH	,, ,, ,, ..	2	0	4¾
JW	,, ,, ,, ..	5	0	4¾
GMH	,, ,, ,, ..	2	0	4¾
JDB	,, ,, ,, ..	2	0	5
EA	,, ,, ,, ..	5	0	4¾
Various	.. ..	5	sundry	
	.. ..	8	not sold	
Carisbrook, Saxon, Dunottar.				
F M in reversed triangle G	Grs.sup. ..	11	0	6½
	,, ,, ..	19	0	5¼
Baza	Scd. ,, ..	24	1	0½
	,, ,, ..	23	not sold	
TOM	Grs.sup.com. ..	25	0	5¼
HDS	,, ,, ..	103	not sold	
Various	.. ..	24	not sold	

RAINFALL, JANUARY, 1901.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

Station	INCHES.
I. CAPE PENINSULA:	
Royal Observatory (*a*) 12 inch gauge	5·09
Do. (*b*) 8 inch gauge	
Do. (*c*) 8 inch gauge on roof	
Cape Town, Town House	5·21
Do. South African College	6·115
Do. Molteno Reservoir	6 87
Do. Platteklip	8 88
Do. Signal Hill	3·67
Table Mountain, Disa Head	4 81
Do. Kasteel's Poort	10·20
Do. Waai Kopje	11·27
Do. St. Michael's	11·62
Devil's Peak, Block House	9·74
Do. Nursery Gauge	8·11
Do. Lower Gauge	7 22
Rondebosch	7·59
Newlands (Montebello)	n.r.
Bishop's Court	10·17
Claremont (Sanitarium)	10·01
Do. (Oaklands)	n.r.
Kenilworth	10·79
Wynberg (St. Alban's)	n.r.
Do. (St. Mary's)	7·81
Groot Constantia	9·69
Tokai	5·96
Simon's Town (Wood)	5·35
Do. (Gaol)	4·97
Blaauwberg Strand	n.r.
Robben Island	2·81
Strandfontein	2·94
Camp's Bay	4·68
Mouille Point	
Fish Hoek	3·76
Cape Point	1·43
Smith's Farm	4·48
Durbanville	4·54
Sea Point	4·35
II. SOUTH-WEST:	
Langebaan (Saldanha Bay)	
Eerste River	4·56
Klapmuts	5·44
Stellenbosch (Gaol)	4·69
Do. (Experimental Farm)	
Somerset West	4·98
Paarl	5·71
Wellington (Gaol)	6·49
Do. (Huguenot Seminary)	n r.
Groot Drakenstein (Weltevreden)	6·86
Tulbagh	4·16
Kluitjes Kraal	6·02
Houw Hoek	n.r.
Ceres	9·44
Rocklands	5·11
Caledon	2·96

Station	INCHES.
II. SOUTH-WEST:—*continued.*	
Caledon (Gordon)	
Worcester (Gaol)	2·57
Do. (Meiring)	2·57
Hex River	3·55
Lady Grey (Div. Robertson)	1·19
Robertson	2·06
Do. Govt. Plantation	1·99
Ashton	
Montagu	2·60
De Hoop (Div. Robertson)	1·76
Karnmelks River	2·72
The Oaks	4·84
Rawsonville	8·04
Weltevreden (Morton)	2·62
Danger Point	1·264
III. WEST COAST:	
Port Nolloth	0·25
Do. (Howard)	n.r.
Klipfontein	1·09
Kraaifontein	0·43
O'okiep	0·60
Springbokfontein (Gaol)	1·075
Concordia	n.r.
Garies	n.r.
Kersefontein	3·31
The Towers	5·18
Dassen Island	6·10
Malmesbury	4·67
Piquetberg	5·02
Van Rhynsdorp	n.r.
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	1·91
Welbedacht	n.r.
Hopefield	3·33
Lilyfontein	n.r.
Wupperthal	2·31
Zoutpan	2·54
IV. SOUTH COAST:	
Cape L'Agulhas	1·29
Bredasdorp	1·66
Swellendam	3·00
Heidelberg	1·86
Riversdale	0·83
Herbertsdale	n.r.
Geelbeks Vlei	0·34
Mossel Bay	1·14
George	2·40
Ezelzagt	n.r.
Millwood	n.r.
Sour Flats	n.r.
Concordia	n.r.
Knysna	2·09
Buffels Nek	n.r.
Harkerville	n.r.

IV. SOUTH COAST:—*continued.*	INCHES.
Plettenberg Bay	1·81
Forest Hall	n.r.
Blaauwkrantz	2·04
Storm's River	3·97
Witte Els Bosch	4·78
Humansdorp	2·42
Cape St. Francis	3·23
Hankey	n.r.
Witteklip	1 69
Van Staadens (upper)	1·51
Do. (lower)	1·28
Uitenhage	0·49
Do. (Inggs)	n.r.
Dunbrody	0·52
Port Elizabeth (Harbour)	0·50
Walmer Heights (near Port Elizabeth)	1·01
Tankatara	0·25
Lottering	2·85
Shark's River (Nursery)	n.r.
Do (Convict Station)	0·79
Grootvader's Bosch	4·39
Armadale	n.r.
Victoria Park	0·47
Vogel Vlei	4·69
Great Brak River	1·14
Melkhoutfontein	1·98

V. SOUTHERN KARROO:	
Touws River	n.r.
Ladismith	1·11
Amalienstein	1·24
Calitzdorp	0·40
Oudtshoorn	0·60
Vlakte Plaats	0·62
Uniondale	0·68
Kleinpoort	0·00
Glenconnor	n.r.
Seven Weeks Poort	2·21

VI. WEST CENTRAL KARROO:	
Matjesfontein	n.r.
Prince Albert Road	n.r.
Fraserburg Road	0·00
Prince Albert	0·50
Zwartberg Pass	2·65
Beaufort West	0·18
Dunedin	0·00
Nel's Poort	0·13
Camfer's Kraal	0 02
Lower Nel's Poort	n.r.
Baaken's Rug	n.r.
Willowmore	0·25
Steytlerville	n.r.
Roosplaats	n.r.

VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	0·00
Do. (Bedford)	0·00
Aberdeen Road	0·00
Rietfontein	0·00
Winterhoek	n.r.
Klipdrift, De Erf	0·15
Kendrew	0·00

VII. E. C. KARROO:—*continued.*	INCHES.
Graaff-Reinet	0·00
Do. (College)	0 06
New Bethesda	0·00
Roode Bloem	0·00
Wellwood	n.r.
Do. Mountain	n.r.
Jansenville	0·00
Patrysfontein	0·00
Toegedacht	0·00
Klipfontein	0·13
Cranemere	n.r.
Pearston	0·33
Walsingham	0·03
Somerset East	0·25
Do. (College)	0·535
Longhope	n.r.
Middleton	n.r.
Corndale (Div. Aberdeen)	0·00
Cookhouse	0·79
Doornbosch, Zwagershoek	0·56
Middlewater	0·18
Darlington	n.r.
Roode Hoogte	0·00
Buffel's Kloof	0·61
Arundale	0·37
Engineer's Yard	0·04
Bloemhof	0·00

VIII. NORTHERN KARROO:	
Calvinia	n.r.
Middelpost	n.r.
Sutherlanp	1 44
Rheboksfontein	n.r.
Fraserburg	n.r.
Onderste Doorns	n.r.
Droogefontein	0·80
Gannapan	n.r.
Carnarvon	0.035
Wagenaar's Kraal	0·00
Brakfontein	n.r.
Vogelstruisfontein	0·00
Victoria West	0·11
Britstown	0·20
Murraysburg	0·00
De Kruis	n.r.
Richmond	0·06
De Aar	0·00
Middlemont	0·00
Hanover	0·00
Philip's Town	0·09
Boschfontein	0·00
Petrusville	n.r.
The Willows	n.r.
Naauwpoort	n.r.
Middelburg	n.r.
Colesberg	0·12
Tafelberg Hall	0·00
Rietbult (Colesberg Bridge)	n.r.
Stonehills	1·24
Cradock	0·19
Do. (Rose)	0·22
Varsch Vlei	0·00
Witmoss	2·58
Steynsburg	0·10

VIII. N. KARROO—*continued.*	INCHES.
Steynsburg (Nesemann)	n.r.
Daggaboer's Nek	4·15
Springfield	
Quagga's Kerk	n.r.
Tarkastad	0·43
Drummond Park	0·27
Riet Vlei	0·00
Brand Vlei	n.r.
Williston	
Omdraai's Vlei	n.r.
Zwagersfontein	n.r.
Varken's Kop	0·03
Culmstock	0·12
Doorskuilen	0·00
Houwater Dam	n r.
Hillmoor	0·00
Glen Roy	0·69
Fish River	n.r.
Spitzkop	0·00
Phizantefontein	0·10
Biesjesdam	n.r.
Groot Vley (Theebus)	
Kleinhaasfontein	0·00
Zeekoegat	0·115
Beyersfontein	0·12
Haasfontein	0·00
IX. NORTHERN BORDER:	
Pella	0·00
Kenhardt	0·03
Van Wyk's Vlei	0·00
Prieska	0·00
Dunmurry	0·61
Griqua Town	0·25
Campbell	0·55
Douglas	0·67
Avoca (Herbert)	0·25
Eskdale	n.r.
Hope Town	0·35
Orange River	n.r.
Newlands (Div. Barkly West)	0·91
Groot Boetsap	1·16
Kimberley (Gaol)	0·67
Do. (Harrison)	0·43
Beaconsfield	
Bellsbank (Div. Barkly West)	n.r.
Grootdrink	
Barkly West	1·01
Upington	0·02
Trooilapspan	0·00
Anenous	0·21
The Halt	0·00
Karree Kloof	0·24
New Year's Kraal	0·16
X. SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	
Fairholt	n.r.
Cheviot Fells (Bedford)	0·34
Alicedale	n.r.
Bedford (Gaol)	2·32
Do. (Hall)	n.r.
Sydney's Hope	1·08
Cullendale	1·43

X. SOUTH-EAST:—*continued.*	INCHES.
Adelaide	0·77
Atherstone	0·92
Alexandria	0·65
Salem	0·51
Graham's Town (Gaol)	1·30
Do. (Bact. Inst.)	1·04
Heatherton Towers (near Graham's Town)	1·60
Fort Beaufort	0·20
Katberg	n.r.
Balfour	1·24
Seymour	0·91
Glencairn	0·79
Alice	0·71
Lovedale	n.r.
Port Alfred	0·36
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	0·93
Cathcart	0·35
Keiskama Hoek	0·14
Dynamite	0·56
Thomas River	1·25
King William's Town	0·95
Do. Hospital	1·18
Stutterheim (Wylde)	2·05
Do. (Beste)	1·96
Dohne	2·50
Kubusie	0·00
Blaney	n.r.
Kei Road	0·30
Evelyn Valley	n.r.
Berlin	0·30
Isidenge	n.r.
Forestbourne	3·16
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	n.r.
Komgha	1·21
Prospect Farm (Div. Komgha)	n.r.
Komghagave	
East London, West	0·96
East London, East	1·90
Fountain Head	n.r.
Fort Cunynghame	
Katberg Sanatorium	3·17
Cuylerville	0·99
Bolo	n.r.
Fort Fordyce	n.r.
Melrose	2·79
Sunnyside (Grahamstown)	0·80
Chiselhurst	0·88
Vischgat	0·69
Sterkspruit	0·78
XI. NORTH-EAST:	
Venterstad	0·05
Ellesmere	0·32
Burnley, Cyphergat	n.r.
Burghersdorp	0·00
Burghersdorp (Le Roex)	0·00
Molteno Station	n.r.
Cyphergat	0·11
Thibet Park	0·15

XI. NORTH-EAST—*Continued.*	INCHES.
Sterkstroom	n.r.
Sterkstroom (Giddy)	0·35
Rocklands	0·35
Aliwal North (Gaol)	0·00
Aliwal North (Brown)	0·35
Rietfontein	0·49
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	0·76
Jamestown	0·20
Queenstown (Gaol)	0 44
Queenstown (Beswick)	0·47
Dordrecht	0·48
Tylden	0·72
Snow Hill	n.r.
Herschel	1·90
Lady Grey	2·20
Bolotwa, Contest	1·23
Lady Frere	0·35
Avoca (Div. Barkly East)	n.r.
Keilands	1·23
Barkly East	1·78
Glenlyon	3 73
Gateshead	3·27
Lyndene	0·06
Mooifontein	0·12
Poplar Grove	0·36
Biesjesfontein	n.r.
Whittlesea	0·67
Blikana	2·27
XII. KAFFRARIA:	
Slaate, Xalanga	0·53
Ida, Xalanga	0·25
Cala, Xalanga	n.r.
Cofimvaba	1·58
Nqamakwe	0·94
Main	1·24
Engcobo	2·47
Butterworth	1·16
Kentani	1·33
Maclear	2·49
Idutywa	1·43
Willowvale	1 80
Mount Fletcher	4·01
Elliotdale	n.r.
Mqanduli	0.00
Matatiele	n.r.
Umtata	3·32
Qumbu	0·53
Kokstad	2·15
Port St. John's	1·433
Umzimkulu	2·90

XII. KAFFRARIA—*continued.*	INCHES.
Woodcliff	n.r.
Tabankulu	2·13
Kilrush	5·99
Somerville (Div. Tsolo)	3·30
Tsomo	1·64
Kilrush	5·99
Mount Ayliff	1·929
Seteba	2·05
Flagstaff	2·83
XIII. BASUTOLAND:	
Mafeteng	1·44
Mohalie's Hoek	0 85
Qacha's Nek	4·20
Moyeni Quthing	n.r.
Teyateyaneng	4·74
Leribe	n.r.
Butha Buthe	4·37
Maseru	3·00
XIV. ORANGE RIVER COLONY:	
Jacobsdal	n.r.
Philippolis	n.r.
Bethulie	0·05
Jagersfontein	n.r.
Bloemfontein	n.r.
Smithfield	n.r.
Wepener	n.r.
Kroonstad	n.r.
Fauresmith	n.r.
Frankfort	n r.
Ladybrand	n.r.
XV. NATAL:	
Durban, Observatory	5·93
XVI. THE TRANSVAAL:	
Johannesburg	5 20
Do. Cemetery	4·81
Doornfontein	5·42
Bremersdorp, Swaziland	
XVII. BECHUANALAND	
Vryburg	0·00
Maritzani	
Mafeking	
Taungs	2.85
Doornbult	
Morokwen	
XVIII. RHODESIA:	
Salisbury	
Hope Fountain	6·71
Geelong	4·37

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday last, February 23, 1901, as telegraphed from Natal and by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE	A. Wheat. per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Beaufort West ..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Burghersdorp ...	0 12 0	...	...	...	...	0 12 6	...	0 10 0	0 7 0	...	...	0 0 7	0 0 9	0 1 9	...	...
Cape Town ..	0 10 9	0 13 9	0 11 0	0 8 6	0 9 6	0 10 0	0 11 0	0 12 0	1 0 0	0 0 6½	0 0 6½	0 0 7½	0 1 6	0 2 6	17 0 0	1 4 0
Clanwilliam ..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Colesberg ...	...	...	...	...	...	0 12 6	...	0 10 6	1 0 0	...	...	0 0 7	0 1 6	0 2 6	...	1 1 0
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	0 11 6	0 18 0	0 17 6	0 9 6	0 9 9	0 15 9	0 18 0	0 12 6	0 14 6	0 1 6	0 1 0	0 1 0	0 1 9	0 2 9	23 5 0	1 4 0
Graaff-Reinet ...	...	...	...	..	...	...	...	...	...	...	...	.	...	...	...	...
Graham's Town ...	...	...	...	0 11 0	...	0 12 6	...	0 10 0	0 9 6	0 1 1	0 0 8	0 0 9½	0 1 10	0 2 1	...	...
Kimberley ...	0 13 0	0 17 6	0 14 6	0 13 0	0 13 0	0 11 6	0 16 0	0 14 0	1 5 0	0 1 6	0 0 11	0 0 9	0 2 9	0 3 6	17 10 0	1 1 0
King Wm's Town	0 17 6	0 16 6	0 15 0	0 12 6	0 12 0	0 15 [illegible]	...	0 10 6	0 13 6	...	0 0 10	0 0 9	0 1 6	0 2 6	20 10 0	...
Malmesbury ...	0 10 6	0 15 0	0 12 0	0 10 0	...	0 9 0	0 10 0	0 9 6	0 15 0	0 1 6	0 0 7½	0 0 6½	0 1 6	0 1 9	16 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 17 0	0 12 0	0 9 0	..	0 6 0	0 10 0	0 7 6	0 14 0	0 1 0	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	...	..	...	...	..	..	...	...	...	...	...	..	...
Port Alfred	...	...	...	...	...	...	...	0 8 0	0 6 0	...	...	...	0 1 6	0 1 6	...	...
Port Elizabeth ...	...	...	...	...	...	0 10 0	...	0 8 0	0 15 0	...	...	...	0 1 9	0 2 9	..	..
Queen's Town ...	0 12 6	0 17 6	0 14 3	0 14 0	0 12 0	0 15 6	0 15 3	0 12 0	0 8 0	0 2 6	0 0 9	0 0 9	0 1 0	0 3 0	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Worcester ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTE.—No Returns were received from Aliwal North, Beaufort West, Clanwilliam, Cradock Dordrecht, Graaff-Reinet, Tarkastad or Worcester.

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AGRICULTURE.

Reports and Prospects.

Bizana, *Feb. 2nd.*—We have not had rain, which is badly wanted, since the first week in January, and the heat is telling on crops and grass. A few swarms of locusts still hover along the coast. All kinds of stock are doing well; several horses, however, have died in the district, apparently from grass staggers. B. COTTERELL, A.R.M.

Bredasdorp, *Feb. 25th.*—Very fine rains have fallen throughout this division during the past three weeks, and everything is looking fresh and green. The rain gauge in the village recorded over 3½ inches during that period. All stock are in fair condition and no complaints of sickness have been received. The wheat and barley crops were very good, but oats were a complete failure.

C. THWAITS, C.C.

Butterworth, *Feb. 1st.*—During the past month portions of the district have been visited by moderate rains, whilst no rain to speak of has fallen in others. A good general rain is required to freshen up crops and pasturage, which are beginning to wear a dried-up appearance. Horses, cattle and small stock are in fairly good condition, and only one case of lung-sickness has been brought to my notice.

J. YOUNG, A.R.M.

East London.—BRAAKFONTEIN, *Feb. 2nd.*—Crops generally are most promising, though a good rain is much desired. Fruit is fairly plentiful in the shape of apples and pines; bananas also show well. Young locusts are now hatching out in numbers in certain localities, and many farmers are waging war against them, availing themselves of the Government aided scheme. It is now the most favourable time for tackling these pests on their hatching grounds, and it is to be hoped that the supply of spray pumps offered by the Government will be equal to the demand. Stock healthy and pasturage abundant.—W. R. ELLIS. WARRENDALE, *Feb. 1st.*—There has been no rain here since what fell in December, and rain is much needed to bring on what crops are growing, which look fairly well, considering the dry weather. Mealies may be planted certainly up to the middle of February on the coast. I have grown fine crops from seed planted at that period, only rain is needed. Grass for cattle is plentiful, but shows want of moisture. We hear rumours of a new cattle disease from other parts of the country, but I have not heard of any outbreak of disease in this Field-Cornetcy. There are of course the usual ordinary deaths which occur among farm stock, but nothing more has come to my knowledge. A good rain will freshen up everything, and replenish drinking places, which are many of them getting low, and I hope set some ploughs going for more mealies.—T. WARREN. WARD 2, *Jan. 31st.*—Mealies which were sown in the early part of the month are looking well, and with the rain falling to-day should give good results. There is very little other produce, about 5,000 bundles of oathay have been reaped, and about 5 bags of wheat. No locusts of any kind in this Ward at present. The peach moth has made its appearance in orchards, and peaches will be scarce. Apples, a good crop. No contagious disease amongst cattle to report.—E. HOLDSTOCK. WARD 3, *Jan. 31st.*—All growing crops are looking as well as anticipated, and recent showers coupled with a heavy storm of rain on the 26th will materially aid advanced crops towards maturity. The mealie sowings have not been as extensive as they might have been, but the shortfall has

presumably been caused through the presence of small swarms of locusts during the sowing season; these, however, have disappeared or have died through the good work done by a fly or maggot. The forecast with regard to the crop of Japanese plums has been verified, very few trees have carried fruit, and in all cases the quantity has been small. Pineapples are plentiful, and are selling at a low rate; apples, too, are fair, and quality good. Stock are in good condition, but need constant attention to keep the bont ticks down within reasonable limits, and special care to preserve the teats of milch cows and heifers in healthy condition.—T. WILLOWS. WARD 6, *Feb. 1st.*—The prospects of very fine mealie and Kaffir corn crops are good. Of other cereals there has been very little harvested as young locusts have mostly destroyed them. Root crops have turned out better than was at first expected. Of beans very few have been planted as it kept dry during January. Stock are healthy and in good condition.—W. KRETZMANN.

Elliotdale, *Feb. 4th.*—There is very little to report this month. A few showers of rain have fallen but more is required. The crops are healthy and well advanced. Large swarms of locusts appeared along the coast and voetgangers have been hatched. Efforts have been made to destroy them, and in many cases with success, soap and water being used. No disease has been reported amongst cattle or sheep, and they are in very fair condition.

W. HARGREAVES, R.M.

Flagstaff, *Feb. 2nd.*—The past month has been most favourable for growing crops and Natives have been busy hoeing their lands. Stock, large and small, are doing well. One case of lung-sickness was reported and has been suitably dealt with. No full-grown locusts have been seen in this district, but voetgangers have been reported towards the middle of it, and Natives have been instructed to destroy all swarms as soon as they make their appearance.

J. REIN, R.M.

Fort Beaufort, *Feb. 5th.*—There was last month a rainfall of 4·03 inches, and the country is in fine order. Mealie and Kaffir corn crops are very promising, and there is every prospect of a heavy yield. Other crops, also, are looking equally well. Stock of all kinds are in prime order, and free from disease. Our market is well supplied with vegetables, and butter is plentiful at low rates.

B. BOOTH.

Idutywa, *Feb. 4th.*—Harvest prospects are gloomy, with great heat and insufficient rainfall, and the pasturage is drying up. Stock are in fair condition, and there are no locusts.

F. BELL, R.M.

Kentani, *Feb. 8th.*—Good rains fell during the past month in some parts of the district, but in others the showers have been light and insufficient. Still, on the whole, crops promise well, and, if only

the next few weeks are favourable, good mealie and Kaffir corn crops will be harvested. Crops are certainly better than at any similar period during the past three years. Young locusts have, however, appeared along the coast, but every effort is being made to destroy the swarms. The weather has been oppressive and sultry for the last few weeks, with occasional showers of rain. Stock are looking well and ticks have not been so bad this summer as usual, which I attribute to the general burning of the grass so freely indulged in last winter. N. THOMPSON, R.M.

Kokstad, *Feb. 1st.*—Comparatively little rain has fallen during the past month. In the greater part of the district, however, the veld still remains good, and those crops which the lateness of rains did not prevent from being planted are doing well. Stock of all kinds are in good condition and are fetching high prices. Locusts appear to have quite deserted the district. W. LEARY, R.M.

Libode, *Feb. 1st.*—There is very little of importance to add to my report for the month of December last. The earlier part of last month was very dry, and towards the end of the month a few nice showers of rain visited the district which saved growing crops. The veld is still very good here and mealies and Kaffir corn are looking their best, and in the absence of a locust plague I anticipate a good harvest for Natives. Stock of all kinds are looking very well and there is no disease amongst them. J. GARNER, R.M.

Lusikisiki, *Jan. 31st.*—The present state of this district, from a farmer's point of view, is all that can be desired. During the month ended to-day almost continuous showers of rain have fallen, and, as a result, stock and crops have benefited most materially. In the St. John's River valley the harvesting of mealies has begun, and in a few weeks' time will have become general in that locality. Locusts, strange to say, appear to have done little damage in this district, although our neighbours further down the coast line have suffered severely by their depredations. Cattle are in prime condition, and judging from the high prices offered and refused are in strong demand. The rearing of sheep is carried on here in a very small way. Common sheep are an unknown quantity and "Afrikanders" are few in number. E. GILFILLAN, A.R.M.

Maclear, *Feb. 15th.*—Rain is much needed in this district. Towards the mountains thunderstorms have fallen during the month, but there are parts where rain has not fallen for some considerable time. During the month forage has been reaped near the mountains, and in many instances a good yield has been returned and a fair crop secured. H. BUNN, R.M.

Matatiele, *Feb. 2nd.*—Prospects for growing crops are perhaps somewhat better than a month or so ago though not nearly enough rain has yet fallen. The harvest will in any case certainly be below the average. Stock of all kinds are doing well, and should the

winter not come too early, and with late rains, the pasturage will thoroughly recover itself after the unusually protracted drought.

W. BELLAIRS, R.M.

Mount Ayliff, *Feb. 5th.*—The growing crops of mealies are looking well. Some crops of forage have been reaped, in spite of the ravages of birds and insects. The pasturage is becoming dry and rain is much needed. Stock both large and small are in good condition, and there is no contagious disease among animals in this district at present. R. HARRIES, R.M.

Mt. Fletcher, *Feb. 2nd.*—Nice rains have fallen during the month, consequently veld and crops look well. No locusts in district, and no reports of disease amongst stock. Cattle, horses and small stock are doing well. H. TILLARD, R.M.

Mt. Frere, *Jan. 31st.*—Since my last report there is little further to add. Very little rain has fallen during the latter part of the month, and the veld and crops are consequently beginning to look parched, but the weather during the last few days promises to change for the better. The locusts which were reported to be in this district have now been completely destroyed. Small-pox still prevails amongst the Natives in some locations, but it is steadily diminishing, and I hope to be able in a month or two to report its disappearance. No fresh cases of lung-sickness have been reported, and stock of all kinds are in good condition. H. GARNER, A.R.M.

Mqanduli, *Jan. 5th.*—There is nothing to add to my last month's report. Mealie and Kaffir corn crops are very promising, but unless rain comes soon they will suffer much. Locusts are in many of the lower parts of the district and causing alarm, notwithstanding every effort to drive them away. The fungus is much thought of, and I issue a good quantity to Natives for their own use. Terrific wind-storms have occurred, and I am informed that the more forward crops about Enzulwini have been so twisted and broken that there is small chance of their recovery. Semi-starvation is very apparent throughout the district, but, so far, the Natives have been most careful in the use of the small amount of food available; generous, as they ever are, to their even more destitute relatives and friends who arrive to share their meagre fare. In turn many others of this district have gone with their families to other districts to share the hospitality of their more fortunate relatives. L. FARRANT, R.M.

Ngqeleni, *Jan. 31st.*—During the early part of this month there was a little rain, but dry weather set in accompanied by extreme heat which continued up to the 30th, and it was feared that crops would suffer. Since yesterday, however, it has been raining heavily. Young locusts have been hatching in great numbers, but the work of destroying them is being vigorously carried on and the swarms are being considerably diminished. Stock of all kinds are in splendid condition, and there has been very little sickness. J. MORRIS, R.M.

Nqamakwe, *Feb. 3rd.*—With the exception of a very few and very slight local thunder-showers no rain visited this district during the past month. Mealie crops look well, but unless rain falls soon they will perish. A few outbreaks of lung-sickness occurred, otherwise stock are in good condition and healthy. C. WARNER, R.M.

Peddie, *Mar. 6th.*—During the past month nice showers have fallen, and the veld and majority of crops look well. A few of the latter, however, were so scorched by previous hot days that they could not recover. Stock of all kinds are in good condition and healthy. A. W. PRESTON, A.C.C.

Port Alfred, *Mar. 2nd.*—Several light rains fell during the month, consequently mealie and Kaffir corn crops are in good condition. More rain is, however, badly needed. The summer is now practically over, and not a single heavy thunderstorm has visited us throughout the season. Stock are in fairly good condition. Fruit has suffered severely from moth and maggot fly. W. SCULLY, C.C.

Port St. John's, *Feb. 1st.*—Harvest prospects are very forward, mealies and Kaffir corn are looking well, and the locusts at present are not troubling much. Every effort is being made to try and get the Natives to destroy the young ones before they are able to fly. Pasturage is in good condition and so are stock of all kinds.

W. TURNER, R.M.

Qumbu, *Jan. 31st.*—The month now closing has been hot and somewhat dry. Only occasional rain-storms have passed over parts of the district, two of these being accompanied by high wind and hail, which caused great destruction to growing crops. Mealies and Kaffir corn will recover. A European farmer living at Roza had his whole crop of oat-hay, fit to cut, destroyed, and he assesses his loss at £150 at least. A good many deaths from gall-sickness in cattle have occurred in the district, due, I presume, to the luxuriant growth of the pasturage. A few more cattle have fallen to lung-sickness in the quarantined area alluded to in my report for December. So far the disease has not spread beyond the defined area. A. REIN, R.M.

Tabankulu, *Jan. 31st.*—Rain is much needed. Standing crops are very promising, and there is every indication of a good harvest. Pasturage is abundant, and stock of all kinds are doing well.

R. WILSON, A.R.M.

Tsolo, *Jan. 31st.*—Rain is very much needed for the crops in some parts of the district. Thunderstorms have fallen occasionally, but as they have been accompanied by hail they have done more harm than good, whole strips of cultivation having been cut down in their course. On the other hand, in a few favourable localities the crops are reported as looking well. Anthrax in cattle has appeared in one location, and several have died from the disease and numbers are sick. There was also one known case of Quarter-evil.

J. SIMPSON, R.M.

Umzimkulu, *Jan. 31st*.—There is nothing of importance to report with respect to agriculture. The standing crops of cereals are looking well, and the pasturage is good all over the district. Cattle and horses are free from disease. The purchase of large numbers of the latter by the Imperial Military authorities has reduced the number in the district considerably and enhanced their market value. Sheep are likewise free from disease except that here and there a few are infected with scab. Though rains have fallen during the month, they have been slight and of short duration. It appears the Western Province of the Colony is being favoured with the heavy rains we in these parts should have at this time of the year.

E. J. Whindus, R.M.

Willowvale, *Feb. 11th*.—Owing to the fact that a disease suspected of being Rinderpest had broken out in numerous kraals in the district I did not report on agricultural prospects as usual at the close of last month, but delayed doing so until the arrival of Veterinary Surgeon Hutchence, with whom I visited all the suspected kraals during last week. I am glad to say that the disease was only veld-sickness, due to change of pasturage, the cattle having come from dry sweet veld to the luxuriant coarse bush veld along the coast. In our tour of inspection, however, I regret to state that we found a number of horses affected with glanders, and those we had destroyed, but there are a large number of others which Mr. Hutchence suspects and cannot definitely state to be suffering from glanders until he receives the appliances from Cape Town for testing. Along the coast numerous swarms of voetgangers of the Egyptian or red locust have hatched out, but Natives have had marked success in reducing the swarms by means of dissolving blue mottled soap in boiling water, and sprinkling the swarms with this fluid, the operation being retarded, however, by the high "dobo" grass, into which many of the insects escape, though I trust that by perseverance the pest will be eventually exterminated. Crops are very promising, and there is every prospect that the harvest this season will be double or treble what it was last year.

M. Liefeldt, R.M.

Experiments on Wheat Manures.

With reference to the article under the above heading which appeared in the *Agricultural Journal* of the 31st January, 1901, it may be mentioned that the experiments with manures therein referred to were conducted by the Principal of the Agricultural School at Elsenburg, Mr. Wm. G. Mason.

The name of Mr. Simons at the conclusion of the article only relates to the analysis of the two samples of soil from Elsenburg submitted by the Principal, which should have been printed as an annexure to Mr. Mason's interesting Report.

The Chemical Composition of the Soils of the South-Western Districts of the Cape Colony.

By Chas. F. Juritz, M.A.

(Read January 31, 1900.)

By kind permission of the Philosophical Society of South Africa, conveyed through the Secretary, Dr. G. S. Corstorphine, the Department is enabled to reprint below the very able and interesting paper read before the Society by Mr. Chas. F. Juritz, M.A., entitled "The Chemical Composition of the Soils of the South-Western Districts of the Cape Colony":—

Amongst the many valuable papers read before this Society from time to time no record is to be found of any dealing with the chemical composition of the various classes of soil met with in the Colony. This may, perhaps, be regarded as surprising to scientific investigators in other lands: have we not heard, again and again, almost *ad nauseam*, the agriculturist described as the country's backbone, and has not the soil been termed, and quite rightly, the only permanent and reliable source of wealth in any country? Such being the case, how is it that we have hitherto heard so little about it? One reason is clearly the paucity of men capable of conducting scientific research in this Colony. For private investigators, except they be men of considerable means, the researches involved in the analysis of a country's soils are far out of reach, and, all the world over, the practice has been for such investigations to be conducted under Government auspices. Where these inquiries have been set afoot, moreover, they have been carried out through the media of Agricultural Departments. Now in this country the Department of Agriculture is just getting into its teens: very unambitious was its inauguration, and whatever error, if any, there has been in its subsequent development, it has assuredly *not* been on the side of forced growth. Hence, when an analytical laboratory was instituted—the indispensable adjunct to a Department of Agriculture—it was on an extremely modest scale. Scientific research was, for the first few years of its existence, looked upon as an Utopian ideal, and even now one requires to tread the way cautiously and warily. The object, at the initiation of the laboratory, was rather to provide means for analysing such articles as solitary farmers and others might chance

Note.—The diagrams referred to in this paper are not reprinted, but anyone wishing to peruse the subject further, will find the paper complete, *with diagrams*, in the "Transactions of the Philosophical Society of South Africa," vol. xi., part 2, pp. 125 to 160.

to submit for the purpose. It was the individual who was to be served rather than the country at large. For a few years this principle had been maintained, and in this state I found the Government analytical laboratory upon being placed in charge of it eight years ago. Things were expected to move slowly, and drastic changes were not to be dreamt of, so I had to remain perforce content with gradual developments.

It is just about ten years ago that circumstances were brought to my notice which ultimately led to a systematic investigation into the chemistry of the soils of the Colony. Towards the end of 1887, while performing certain investigations in connection with my University Fellowship, I was struck by the exceedingly small quantity of phosphoric oxide in some samples of oathay from the Bathurst district, that I was analysing. To this deficiency I ascribed the poor condition of the crops. For some time, too, there had been noticed a prevalence of a bone disease amongst the cattle of the district, and the Colonial Veterinary Surgeon expressed the opinion that this disease was due to a lack of phosphates in the food of the animals. My investigations now confirmed that view, and in remarking thereon in a report dated the 24th of February, 1890, I observed "Judging from the analysis of the plants only, I should say that the soil of the Colony generally appears to be rather poor in phosphates." So small was the amount of phosphatic material in the crops analysed that it seemed a marvel that they ever attained perfection—if the term perfection may be applied to such dwarfed and sickly specimens as they were. A year later I reverted to the subject, and remarked, "I do not regard the matter as settled satisfactorily, and commend it to the attention of the Grahamstown Agricultural School, hoping that ere long proper investigations will be made and the mystery cleared up."

The facts brought to light in connection with the investigations just alluded to showed me how beneficial fuller information respecting the soils of our various districts would be. Towards the end of 1892, therefore, I made a direct recommendation to Government that investigations with the object of eliciting some such information should be undertaken without delay. The assurance of warm support was readily given, and the operations commenced, the virgin clay soils of the Cape Division being the first to be dealt with.

Shortly after this work had been put in hand the services of the Government Botanist were requisitioned from Durbanville, in connection with a parasitic disease (Erysiphe graminis) that had appeared amongst the wheat in that neighbourhood. In connection with Professor MacOwan's investigations five samples of soil from the infected area were submitted for analysis. Fortunately the analytical survey of the soils had by that time advanced sufficiently to enable a comparison to be made between the virgin and cultivated soils of the locality, and in the following table one may see to what extent soil exhaustion had gone on.

2

	Average composition per cent of:	
	Virgin Soils.	Cultivated Soils.
Lime...................	.291	·194
Potash..............	.133	·127
Phosphoric oxide..	·031	·015

In other words, the soil had been exhausted of ·097 per cent. of lime, ·006 per cent. of potash, and ·016 per cent. of phosphoric oxide. Roughly we may say that cultivation had removed from each acre of the surface soil 1,940 lbs. of lime, 120 lbs. of potash, and 320 lbs. of phosphoric oxide. To look at the matter from another point of view: for every pound by weight of lime removed from the soil by a crop of wheat, 4 lbs. of potash and 3 lbs. of phosphoric oxide are needed; relatively to the other plant-food constituents of the soil, therefore, as well as absolutely, the amount of phosphoric oxide, meagre enough even in the virgin soils, had been halved in the process of cultivation; the crops were, in fact, starved in respect of this one essential nutritive element, and were in consequence quite unfitted to resist the attacks of parasitic diseases.

Before proceeding with the actual details of the work done, it may be advisable to say a word or two on the general subject of soil analysis. It may possibly appear superfluous to dilate on the use and benefits of analyses of soils when addressing a Society such as this, and yet I am by no means sure that it is so, for there have not been wanting men of scientific repute who have not only cast doubts upon, but have even openly ridiculed the worth of such investigations. Thus a well-known author, who has given much information to the world on agricultural industries as carried on in the Australian and South African colonies,* "does not hesitate to affirm that the subject of analysis of soil has occupied quite an exaggerated position of importance, not only with the unlearned, but also with those who ought to have known better. One individual," this author proceeds to observe, "often of no repute in the scientific world, resolutely and dogmatically takes the lead, and many follow, sheep-like, without inquiry. This has been painfully the case in connection with soil analyses . . . . . It is quite impossible to determine with certainty in the laboratory, or by any other test than the growth of crops upon it, whether an ordinary agricultural soil is good or inferior." Again†—"No analyst, using the ordinary processes for soil analysis, can determine whether or not such infinitesimal amounts as are required by the crops are present, or are not present, in an available form in a soil," and so on.

Sir Charles Cameron, on the other hand, remarks,‡ "The kind and amount of benefit to be derived from the analyses of soils are becoming every day more apparent. We cannot, indeed, from the results of an analysis prescribe in every case the kind of treatment by which a soil may at once be rendered most productive or even

* Wallace: Rural Economy and Agriculture of Australia and New Zealand, pp. 167, 168.
† Wallace: *Op. cit.* p. 169.
‡ Johnston and Cameron: Elements of Agricultural Chemistry and Geology, p. 3.

improved. In many cases, however, certain wants of the soil are directly pointed out by analyses; in others, modes of treatment are suggested by which a greater fertility is likely to be produced, and, as one's knowledge of the subject extends, we may hope to obtain, in every case, some useful directions for the improvement or more profitable culture of the land."

At one time it was suggested that all that was necessary in analysing a sample of soil was to reduce it to a fine powder, and then to take some of the powdered soil and ascertain how much, say, of potash, phosphoric oxide, or of lime, as the case may be, it contained. If much, the soil was pronounced fertile; if little, barren. Such was the opinion entertained by men of high eminence in their day: an advance, certainly, upon the opinion previously held, that plants were fed by water and water alone, but an opinion, nevertheless, capable of improvement, and improvement came. Baron von Liebig already saw that these views were not quite correct when he said—in 1858*—that soluble constituents of the soil sometimes entered into a kind of combination with other substances in the soil, and so lost their solubility, and at the same time their capacity for circulating about in the soil. It was found, moreover, on the other hand, that from the rootlets of plants exuded an acid possessing the property of acting on some of the insoluble constituents rendering them available to the plant, and in 1866 Dr. Cossa, Professor of Chemistry at an Italian university, pointed out† that if the methods of determining soluble constituents in soil were to give trustworthy results they would have to simulate as closely as possible nature's own mode of dissolving the plant-food constituents in the soil. It was plain that to take *all* that the soil contains in the way of potash, lime, phosphoric oxide and nitrogen as being so much plant food was erroneous, and to take *only that which was soluble in water* as being available would be no less faulty. Different chemists proposed different methods of settling the difficulty, but there was no *organised* mode of solving the problem until, early in the seventies, the Congress of German Experiment Stations took up the matter. Numerous experiments were carried on in laboratories all over the country, and side by side with each of these experiments the soil itself was directly appealed to by actual cultivation. The outcome of these investigations was that the agricultural chemists of Germany, assembled in congress, resolved to adopt certain fixed methods of analysing the soil in such a manner as to approach as closely as possible to natural processes; and this they did, first of all, not by pounding the soil, but by *sifting* it, and so excluding from the portion actually analysed big fragments of bone and other materials that would give a fictitious value to the soil, and would be of too large size to be successfully dealt with by the acids secreted

* v. Liebig: Ueber das Verhalten der Ackerkrume zu den in Wasserlöslichen Nahrungsmitteln der Pflanzen.

† Fresenius: Zeitschrift für analytische Chemie, vol. 5, p. 161.

from the plant's roots. A *fixed weight* of the sifted soil was then taken for analysis, treated with a *definite quantity* of *diluted* hydrochloric acid of a *certain strength* for a *stipulated time* at a *fixed temperature* and under *specified conditions*. Subsequently it was found that, in order to extract the variably available phosphoric oxide, different solvents would be necessary; and for this specific purpose water was used, and a solution of citric acid in ammonia liquor. By these means three "grades," if the expression may be applied, of phosphoric oxide are distinguished. The most immediately valuable part is that which dissolves when a *definite weight* of soil is *continuously* shaken with a *certain volume* of water for *half-an-hour*; next, that soluble under specified conditions in the ammonium citrate solution; and lastly, that insoluble in the latter solution. These methods, which found their chief exponent in the experiment station at Halle, gained such world-wide repute that, at the special request of the United States Department of Agriculture, they were published in book form in 1892. This, as already observed, was the first attempt to organise methods of soil analysis into a practically applicable code. Since then the official agricultural chemists of the United States have also adopted a provisional uniform method, thus following the lead of Germany. France, Italy, and even Russia have in turn followed up, and the United States, in the person of Dr. Wiley,* have rendered great service by collating all the methods in use, and thus international agreement on the subject has been brought appreciably nearer. In England there has been no organised attempt to deal with the matter, and many analysts are still content to follow ancient methods; no wonder, then, that one sometimes hears soil analysis cried down. In 1894, however, Dr. Bernard Dyer recommended the use of citric acid for the extraction of both potash and phosphoric oxide, and, when the value of this method has been properly tested, it is possible that England also may fall into line with the other countries which have adopted standard methods of extracting available plant food from soils.

All will agree that, for agricultural purposes, an analysis of a soil should show only those quantities of the constituents which are really available. That is exactly the ideal that the German and American chemists have been aiming at, and that Dr. Dyer is following up. To say that they have wholly succeeded would be asserting far too much; yet those who are so fond of decrying soil analysis aim all their shafts at a method which (though they know it not) has long been superseded, in Germany and the United States of America, by others whose object is to extract from the soil only those materials which plants themselves can take out. Some chemists have sought to do this in some ways, some in others, but a method of which Dr. Dyer's is a modification has been used at Halle for determining available phosphates in soils years ago, and for this purpose such a method is now officially recognised practically the whole scientific

* Wiley: Principles and Practice of Agricultural Analysis, vol. i.

world over. In brief, the *principle* of extracting available plant-food constituents is generally admitted amongst chemists of standing, the *mode* of applying this principle being the only point of difference. A few isolated persons, unaware of the progress made in the subject, are contending that the *principle itself is wrong*, and the unfortunate thing is that many do not understand how wide of the mark the arguments employed really are. Here, too, to employ the critic's boomerang, it may be said that "one individual, often of no repute in the scientific world, resolutely and dogmatically takes the lead, and many follow, sheep-like, without inquiry."

A few words may be needed regarding the methods employed in our analytical investigations of the Colony's soils, and first of all the collection of the sample requires attention. While travelling about the Colony collecting soils we have frequently been asked to include in our list soils from cultivated lands on this or that farm; soils, therefore, that have been modified by various or repeated cropping—soils, moreover, that have been in all probability considerably altered by the use of manures. For the occupier of that little plot of land an analysis of such a soil will probably have some value, but for the country at large, or even for the surrounding district, it is absolutely valueless. Such a sample is not typical of any extended area, because it has been altered by the agency of man, and, as Dr. Wiley observes, "The physical and chemical analyses of soils are entirely too costly to be applied to samples which represent nothing but themselves."* As our analyses are intended to a certain extent to ascertain the agricultural value of the soils over wide areas, it becomes necessary to include as far as possible only virgin soils that have not been subjected to modifying influences. The practice has been to take the sample sufficiently below the surface to keep it clear of the top growth and accumulations, and then to extend downwards to a depth not exceeding 12 inches. After having been spread out in the laboratory for some days the soil is digested with water and washed through a ½-millimetre sieve by the aid of a small brush, that which passes through being dried and the residue from the wash water after evaporation added to it. The combined weight of the two is then calculated in percentage of the original soil taken, and entered as "fine earth." This fine earth is utilised for the determination of lime, potash and phosphoric oxide in the soil. The residue which does not pass through the ½-millimetre meshes is, after drying, sifted through a sieve with meshes 1 millimetre in diameter; what passes through is known as "coarse sand," and this is included together with the fine earth in determining moisture, organic matter, chlorine and nitrogen. Regarding these latter determinations I do not propose to say much on this occasion, rather confining my remarks to the inorganic plant-food constituents of the soil, namely lime, potash and phosphoric oxide.

The first step in the actual analytical process is the *treatment of the*

* Wiley: *Op. cit.* p. 65.

soil with acid. Two hundred grammes of the fine earth are placed in a large flask and treated with 400 c.c. of hydrochloric acid of specific gravity 1·115; allowed to remain for five days at the ordinary temperature, shaking thoroughly from time to time. After the prescribed period of digestion has expired, the extract is filtered through a dry pleated filter into a dry flask. Two hundred and fifty c.c. of the filtrate are evaporated to dryness in a shallow porcelain dish at first over a small open flame, then on the water bath, and finally on a sand bath or in an air oven at 120° Centigrade until perfectly dry. During evaporation a few cubic centimetres of strong nitric acid are added to the extract. The dry residue is moistened with strong nitric acid and again evaporated to dryness: to expel the nitric acid, the residue is moistened with hydrochloric acid and evaporated on the water bath to as near dryness as possible, taking care to stir towards the end so as to prevent the formation of crusts. This final residue, after warming in the air bath for an hour, is treated with warm water and a 20 per cent. solution of hydrochloric acid, and is then washed over into a 250 c.c. flask, boiled for fifteen minutes, and after cooling the liquid is filled up to the mark with distilled water and filtered into a suitable bottle. This filtered soil extract is then employed for the actual estimations of lime and potash.*

For the *determination of lime* 50 c.c. of the extract (equal to 25 grammes of soil) are removed by means of a pipette into a 250 c.c. boiling flask: after adding two or three drops of rosolic acid solution, ammonia is added very carefully by means of a dropping tube until a pinkish colour makes its appearance in the supernatant liquid. It is then boiled until the pink colour almost disappears again, the alumina and oxide of iron being thus precipitated. After cooling the flask is filled up to the mark, thoroughly shaken, and the contents filtered into a 300 c.c. bottle. One hundred c.c. of this clear filtrate (equal to 10 grammes of soil) are removed by a pipette into a 300 c.c. Erlenmeyer flask; three to five drops of acetic acid are added and 20 c.c. of a 4 per cent. ammonic oxalate solution. The mixture is placed on a water oven for six hours and then filtered through double filter papers. The precipitate on the filters is ignited at first over a Bunsen flame and is then strongly heated in a furnace for ten minutes. After cooling it is weighed and the lime calculated as CaO.

In determining potash another 50 c.c. of the filtered soil extract is placed in a 250 c.c. flask and boiled. Five c.c. of a 10 per cent. solution of baric chloride are added, and the mixture is boiled for some time for the precipitation of sulphuric acid. A few drops of rosolic acid are next added, and the mixture is boiled with ammonia as in the case of the lime determination. When partly cooled down

* It should be observed that the soils from the Riversdale and Mossel Bay Divisions were extracted by means of a modified process. The results in these cases are hence not quite on all fours with the others, and due allowance should be made in comparing them.

2 or 3 grammes of crystalline ammonic carbonate are added, and the temperature is once more raised to boiling-point in order to separate lime and barium. After complete precipitation of the latter the liquid is cooled, the flask filled up to the mark, and the contents filtered. Of this filtrate 100 c.c. (equivalent to 10 grammes of soil) are placed in a platinum basin and heated to dryness on a water bath. The dish containing the residue is heated on asbestos sheet and then carefully over a small open flame until all ammonium salts have been expelled. The residue is then washed through a filter with boiling water into a glass dish. Two c.c. of a 10 per cent. solution of platinic chloride are added, and the mixture is evaporated to dryness on the water bath. After cooling, some dilute alcohol (81 to 82 per cent.) is added to the residue, and it is allowed to stand for at least half an hour. It is now filtered through a Gooch crucible by aid of a filter pump, washed first with 96 per cent., and then with absolute alcohol, and dried for two hours in a water oven. The weight of the crucible containing the potassic platinic chloride having been taken, the precipitate is washed through with boiling water, and the crucible, after again washing with alcohol, is dried and weighed, and the difference between the two weighings taken as the amount of potassic platinic chloride. This amount multiplied by ·193 gives the quantity of potash (K_2O) in the 10 grammes of soil taken.

For the determination of phosphoric oxide 25 grammes of the "fine earth" are placed in a marked 500 c.c. flask, 25 c.c. of concentrated nitric acid are added, and the mixture is thoroughly shaken. Fifty c.c. of concentrated sulphuric acid are next added and the mixture is again carefully shaken up. It is then gently heated, shaking at frequent intervals. If this does not lead to complete oxidation more nitric acid is added and the heating continued. Finally the mixture is cooled and diluted to the mark with distilled water: it is then well shaken and filtered. Two hundred c.c. of the filtered solution (equivalent to 10 grammes of soil) are placed in an Erlenmeyer flask of suitable size, and very nearly neutralised with strong ammonia solution, a few drops of nitric acid being used to acidulate the mixture in case the limit is overstepped. Two hundred c.c. of molybdic solution—prepared by dissolving 150 grammes of ammonic molybdate in a litre of water, and adding this to a litre of nitric acid of specific gravity 1·20—are added, and the mixture is heated to a temperature of 50° C. for three hours in a water oven, and allowed to cool completely. The liquid is decanted through a small filter and the precipitate in the flask washed with diluted molybdic solution. It is then dissolved with warm 5 per cent. ammonia, and the resulting solution is at once very faintly acidulated with hydrochloric acid. From a burette is then added 20 c.c. of magnesia mixture, drop by drop, at the rate of 1 c.c. for every five seconds, and then 25 c.c. of five per cent. ammonia. The mixture is shaken for a short time and allowed to stand for two hours. The precipitate is filtered through a weighed Gooch crucible and washed with 5 per

cent. ammonia solution. The crucible is dried at first on an iron plate and then ignited in a furnace for fifteen minutes. It is then cooled and weighed, and from the weight of the precipitate contained the amount of phosphoric oxide in the soil is calculated.

I have detailed the methods employed in our investigations at some length, for two reasons: firstly, where vastly different results are arrived at by the employment of different methods, it is always desirable to be able to gauge the significance of the results from a knowledge of the method; and secondly, when investigations, such as these, extend over a number of years, it is better far, by the employment of one uniform method throughout the whole series, to ensure that the results shall be strictly comparable with one another, than to risk the almost certain unconformity likely to be produced by the adoption of new methods: hence it is advisable rather to adhere throughout to the method of analysis resolved on at the outset, and to state that method clearly, than from time to time to adopt the new and improved methods which the advances of scientific thought and investigation may develop.

The portion of the Colony selected for our operations happened to be identical with that traversed a year or two later by the Geological Survey, and from our standpoint it is not a little to be regretted that that work did not precede ours, as we would have been greatly assisted thereby. The portion I allude to comprises the south-western districts of the Colony extending from St. Helena Bay to Mossel Bay, and is made up of the divisions of Malmesbury, the Cape, Caledon, Bredasdorp, Swellendam, Robertson, Riversdale and Mossel Bay. Since then we have extended our operations to the Divisions of George, Knysna, Uniondale, Oudtshoorn, Prince Albert, Ladismith and Worcester, while in the Eastern Province the Divisions of Cathcart, Komgha, Butterworth, Willowvale and St. Marks have been dealt with. I say again, it is a pity that at the outset of our investigations we did not have the advantage of the map published with the 1897 Report of the Geological Commission, covering as it does exactly the area of our operations during the years 1894-96. It is with that area I propose to deal in the present paper, and it must be remarked that even now the area surveyed has not been sufficiently extensive to allow of general conclusions being drawn, and therefore it is perhaps somewhat unwise to venture upon statements which time may yet disprove.

I have profited by Dr. Corstorphine's kindness in being able, as it were, to superimpose upon the maps* showing the localities whence our samples were collected, the map published with the Geological Commission's report, illustrating the geological formation in the south-western corner of the Colony. As every endeavour was used, when collecting the samples, to locate the site whence each one was taken as accurately as possible, we have thus been enabled to refer

* Reduced divisional maps were shown when the paper was read.

every sample to the underlying geological formation with a view to deducing conclusions from the results of the analyses.

The area with which I propose now to deal includes part of the divisions of Malmesbury and the Cape, the Caledon, Bredasdorp, Riversdale and Mossel Bay Divisions, and the southern part of the Divisions of Swellendam and Robertson. Within this area 212 samples of soil were collected. Amongst these the geological formations chiefly represented are the Malmesbury and Bokkeveld beds, 75 samples having been collected from the former and 76 from the latter. Besides these we have analysed 10 from the Witteberg beds and 6 lying on Table Mountain sandstone. In eighteen cases the underlying rock was granite and in one the soil rested upon a substratum of Dwyka conglomerate, while 26 soils were taken from areas covered by conglomerates and recent deposits. By far the larger numbers of soils analysed, therefore, came from the geological formations now termed the Malmesbury and Bokkeveld beds. True granite soils were very few in number, but, taken in conjunction with a number of granite soils analysed by Dr. Hahn, and published in the Vine Diseases Commission's report in 1881, some conclusions may possibly be drawn. It may therefore be of value to tabulate the percentages of lime, potash and phosphoric oxide yielded by these analyses; they are as follows:—

Description of Soil.	Lime.	Potash.	Phosphoric Oxide.
1. Partly decomposed granite from Hout Bay	..	·014	·002
2. Partly decomposed granite from Groot Constantia	·025	·011	·009
3. Decomposed granite from Bellevue, Groot Constantia	..	·052	·053
4. " " "	·008	·020	·019
5. Decomposed granite from High Constantia	·002	·013	·019
6. " " "	·081	·043	·075
7. Decomposed granite (uncultivated Red Constantia soil)	·037	.056	·014
8. Alluvial granite soil from Bergvliet ...	·281	·151	·172
9. From Hout Bay	·016	·002	·002
10. " "	·026	·012	·011
11. Groot Constantia	·009	·015	·001
12. " "	·069	·049	·011
13. " "	·039	·031	.019
14. Vlaggeberg, Eerste River	·018	·010	·011
15. " "	·181	·017	·011
16. " "	·063	·004	·007
17. Stellenbosch	·014	·019	·002
18. Somerset West	·034	·029	trace
19. " "	·080	·025	trace
20. Papkuilsfontein, Malmesbury	trace	·049	trace
21. " "	·046	·028	·012

On looking through this table the one feature that is pre-eminently striking beyond all others is the difference in composition between the alluvial soil No. 8, and all the rest, which are primary granite

soils. In the essentials of plant food it is far richer than any other soil. Excluding, then, that sample, we get the following as the average content of the remaining twenty primary granitic soils (I have added the maximum and minimum in respect of each constituent) :—

Lime.			Potash.			Phosphoric Acid.		
Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.
..	·037	1·81	·002	·025	·056	trace	·014	·075

That is to say, the average primary granite soil is poor in all three of the above-mentioned constituents, but of course it will be remembered that many of these soils have been under lengthened cultivation. The poverty of the soil is due to the fact that the minerals of which the granite is composed have not been completely disintegrated, and thus the plant food they contain, though present, is not present in a form available to the plant. For instance, in the case of soil No. 1, the felspar, from which the lime is derived, had remained undecomposed, and hence the sample contained no available lime. A comparison between samples 3 and 4 is interesting: though the former was richer in potash and phosphoric oxide, it was quite destitute of available lime; no wonder, therefore, that the vines on this patch were found to be sickly, whereas the quantity of lime in sample No. 4, small though it was, sufficed to maintain the vines in health. Compare also Nos. 5 and 6: on the latter soil the vines were in good condition, on the former they were diseased. A supply of lime was subsequently given to soil No. 5, and the disease disappeared at once. Between Nos. 11 and 12 a similar comparison holds good, with this in addition—that No. 11 is exceptionally poor in both phosphates and lime. Leaving out of account the alluvial soil No. 8, there is not one amongst the series that could be described as having a normal percentage of lime for agricultural purposes: there is a fair amount in No. 15, but all the others are decidedly poor in that constituent. Nos. 3 and 7 have a fair amount of potash, but here too all the others, excepting of course No. 8, are poor. Nos. 3 and 6 contain phosphoric oxide in fair amount, the rest are poor, some extremely so.

I may mention that I have regarded as poor any soil containing less than ·1 per cent. of lime. or ·05 per cent. of potash or phosphoric oxide, the normal amounts being ·25 to ·5 per cent. for lime, ·15 to ·25 per cent. for potash, and ·1 per cent. for phosphoric oxide.

I have referred to these analyses of Dr. Hahn's because the granite soils being, as it were, nearer home, and their investigation occupying the earlier position in point of time, they form a convenient basis with which to compare later work.

(To be continued.)

Field Experiments in Root Crops.

The following remarks regarding the quantity of available food produced per acre by the growth of root crops are taken from the agricultural columns of the London *Times* of Feb. 11th :—

The results of most field experiments involving the growth of roots are given on the assumption that one ton of roots—be they turnips, or swedes, or mangolds—is as good as another. When, for example, the turnip crop is grown in order to test the effects of different manures, and the different mixtures of manures, the weight of roots yielded per acre is commonly taken as the sole indication of the comparative values of the several manurial dressings in the circumstances under which they are applied. We have, on more than one occasion, suggested that the roots themselves should be tested—that their specific gravity should be ascertained as well as the percentage and composition of the solids in their expressed juice—but it is not possible to refer to any recent experiments where this has systematically been done. That roots vary in the percentage of water which they contain is well known, and it is at least possible that of two turnip crops the one giving the greater weight of roots per acre may actually contain less solid matter per acre than the apparently lighter crop. For feeding purposes the latter is the more valuable, and yet the manure that grew the bulkier crop would be regarded as better than that which grew the one returning a smaller gross weight per acre. Sheep-feeders have been told time after time that to give their animals a large quantity of watery turnips is a physiological blunder, because all the water in the roots has to be raised to the temperature of the blood of the sheep which consume them. But what effort has been made in the many field experiments which county council grants and other sources of income have rendered possible during the last decade to determine the percentages of water contained in turnips of the same variety grown under different conditions, manurial or otherwise? If little has been done to determine the percentage of water, still less has been done to control it. The high practical importance of the question is obvious when it is considered that a difference of 1 per cent. in the total solids of a crop of, say, 30 tons of roots per acre means a difference of 672lb. per acre in the quantity of solid matter elaborated from the air and the soil—in other words, 672lb. of water of no nutritive value is replaced by 672lb. of solid matter of very considerable feeding value. Reflections such as these are suggested by a perusal of the striking essay with which Messrs. James Carter & Co., 237, High Holborn, London, preface their new annual list of farm seeds, and, to mark the beginning of another century, describe in some detail their "new method in the selection of root crops for seed." The work has been in progress for a number of years, but the public announcement of the method followed and of results obtained has been reserved till the present as an appropriate occasion. They

point out that mangolds, for example, contain of water from 85 to 94 per cent. As the 94 per cent. coexists with 6 per cent. of solids, and the 85 per cent. with 15 per cent. of solids, it is obvious that a given weight of the one lot of roots would contain two and a half times as much solid matter as the same weight of the other lot, and their feeding value would be enhanced accordingly, though not necessarily in the same ratio. Swedes have 86 to 92 per cent. of water, yellow turnips 90 to 92, white turnips 92 to 95, carrots 85 to 92, and Kohl rabi 86 to 92 per cent. These figures indicate the difference in value between roots of close, firm, hard texture, on the one hand, and soft, spongy, watery roots on the other. As illustrating what it is in the power of the cultivator to effect by long-continued selection, associated with chemical analysis of the roots, the case of the sugar-beet is taken. In this plant, which is closely allied to the mangold, the proportion of sugar in the roots has been increased from 5 per cent. to a possible 20 per cent. It is true that Continental growers were occupied upon this work throughout the 19th century, but to increase the saccharine matter fourfold is a great result to attain. After describing their own experiments Messrs. Carter enunciate the following conclusions:—(1) All roots have a tendency to contain an excess of water, which in itself is valueless. (2) Some varieties contain water to a harmful degree. (3) A small deviation in the percentage of water alters materially the value of the crop in feeding properties. (4) Five tons of one crop may contain as much solid food as ten tons of another. (5) The obvious necessity arises of ascertaining the weight of solids in any root crop. (6) The specific gravity of a root is a guide to its keeping quality. (7) The specific gravity of the juice is a guide to its feeding quality. (8) When the density is highest in both the juice and the whole root, the value of the stock is materially increased. (9) The increase of saccharine matter in mangolds and all other roots goes hand-in-hand with the increase of feeding matter. (10) The quantity of dry matter is not necessarily a determinating factor in the feeding value of roots. The nature of the testing apparatus employed and the means whereby strains of roots of superior feeding value are fixed and perpetuated are described in sufficient detail in the essay. The great object in view—and it is one that deserves every encouragement—is to increase the quantity of available food produced per acre by the growth of root crops.

Leguminous Crops and Nitrogen.

During the last few years it has been demonstrated that leguminous crops—clover, beans, peas, lucerne, &c.—are able to draw their supplies of nitrogen from atmospheric sources, and that after such crops the soil is actually richer in nitrogen than it was before the growth of the crop. A short time ago, writes C. G. Freer

Thonger, in London *Farm and Home*, I heard a man say that he had doubts of this ability of legumes to obtain atmospheric nitrogen. He believed that the supply of nitrogen came from the subsoil by the capillary processes, by which water is being continually drawn upwards and charged with the elements carried into the subsoil.

Now this matter of nitrogen in the subsoil has been most carefully investigated by scientific men, and it has been found that the amount of nitrogen in the soil rapidly decreases as we go downward into the subsoil, and that there is usually more than three times the amount in the surface soil that there is in the subsoil, and that what there is in the subsoil has been washed there from the surface. If the abovementioned theory was correct, there should be some great reservoir of nitrogen in the subsoil, and until it is shown that there is some such reserve to draw upon the theory stands without proof.

As to the acquisition of nitrogen from the air through the agency of legumes, there is nothing that has been more clearly investigated and more clearly proved. The air is the great reservoir of nitrogen, and it is continually returning there through the chemical actions going on in the soil, and through the washing of the nitrates into the sea to be taken up by other organisms. Our rainfalls bring to the earth several pounds of combined nitrogen every year. The nitrogen exists in the air mixed with the oxygen to enable us to breathe it, for without this mixture of nitrogen the oxygen of itself would burn us all up as quickly as it does the carbon of an incandescent lamp when the bulb breaks. This free nitrogen—which is not chemically combined with the oxygen, but simply mixed with it—permeates the loose cultivated soil. Neither clover nor any other green plant can get any of this free nitrogen by means of its roots, nor by means of its leaves. The leguminous plant is perfectly powerless to obtain and use it of its own accord. It is only when certain microscopic organisms grow on the roots of legumes that the plant gets the use of the nitrogen. When these organisms, which are plants of a low order, are not there, the clover or pea can get no more nitrogen than any other plant.

It has been shown in artificial cultures, when the seeds of legumes were sown in soil destitute of nitrogen, but supplied with the other essentials of plant food, that the plant would germinate and grow only to the extent of the nitrogen contained in the seed, and if it got none from elsewhere it would perish. But when the micro-organisms that form the nodules on the roots of clover and other legumes are introduced into the soil, the plant at once begins to acquire nitrogen and to flourish. There is no subsoil for it to draw upon, nothing but the artificial soil in the pot. Then when we find that the plant does get nitrogen, and that the nitrogen content of the soil increases, we are forced to the conclusion that the micro-organisms have something to do with it. In a soil, no matter what the subsoil may be, none of the legumes will increase the nitrogen in the soil or in the roots if the micro-organisms are absent, and no plant can get the free nitrogen of the air that has not the nodules on its roots. If the nitrogen

simply came from the subsoil by capillary attraction any plant would be as effectual in getting it as the legumes. There are some other plants besides legumes that do get some, but they always get it in the same way—through the agency of the little bacteria that exist in the root nodules. It is considered also that, after the growth of a shading crop, there is an increase of potash and phosphoric acid in the soil, but this is only apparent.

There would be no increase if the elements were not already in the soil, for no mineral matters can come from the air. It is true that the deep roots of clover do bring up some of these mineral elements and leave them in the surface soil. There are two forms of nitrifying bacteria in a soil which is well supplied with organic matter. One of these forms takes the humus, after the bacterium of putrefaction has broken it down, and feeds upon the ammonia, changing it into a nitrite. Then a second form takes the nitrite, and changes it into a nitrate by the formation of nitric acid. When nitric acid is formed in a soil it at once seeks a base. If there is lime or potash present it makes nitrate of lime or potash, and thus puts these into a soluble form in which green plants can use them, for it has been abundantly proved that green plants cannot use nitrogen till it is in the form of a nitrate. These changes take place in the shade of the clover, and the potash is released for the following crop. But it was all there before, and a continuous growth of these crops without addition of lime or potash to the soil tends gradually to exhaust the mineral elements in the soil, and after a while there is an excess of vegetable acids that destroys the nitrifying microbes, and the soil must be manured with potash salts or lime, or both. All these matters are not theory, but have been carefully worked out in laboratory and field, and proved beyond a doubt by men who are never satisfied till they have got at the exact truth.

The roots of plants may be divided into two classes—the feeding roots which grow in the true or cultivated soil where the plant food is most abundant, and the roots which go down deeply into the subsoil in search of a supply of water. We say search of water as though it were a matter of instinct, but the influence which encourages these roots to take a downward direction is the flow of moisture constantly coming up by capillary attraction from below to the surface. The young roots are attracted by the moisture, and grow and go down deeper and deeper. There is a case recorded of a willow—a moisture-loving tree—which grew to be a large tree in apparently a dry soil, but it was found that there was a small leak in an underground tank, several feet away, and deeply below the soil, and guided by the moisture which came up through the soil, the roots found it out, and formed a large mass of fibrous roots in the tank itself.

The depth to which some of these moisture-seeking roots will go down is remarkable. Wheat roots have been traced to a depth of eight and a half feet, roots of onions have been found nine feet down or more, and could be distinguished by their taste. Where deep

cuttings were made across a field of sainfoin for a waterworks culvert the roots of the plant were found twenty feet from the surface, and lucerne roots have been been found even deeper. The habit of grasses, whether deep-rooting or growing with shallow roots, determines their suitability for certain soils. Now, it is easy to see that a field with a hard and almost impenetrable subsoil or pan, created by constant shallow ploughing, will not allow of this deep rooting, and therefore in absence of rain, for even a short time, the crops must suffer, while in other lands which have been subsoiled, and the impediment of a pan broken up, the crop may hold out and come to maturity. Besides the advantage of the deep rooting, the feeding roots of the plant will find food in the broken-up subsoil when they can be distributed among it.—*Melbourne Weekly Times.*

The Character of South African Country.

We are indebted to the *Australasian Pastoralists' Review* for the following extracts from a private letter written by Mr. A. Ramage, a Victorian, serving with Kitchener's Horse. They indicate impressions formed in course of the campaign, and what our Australian cousins think of South Africa as met with :—

"Pastoral and agricultural matters being more in your line, I shall endeavour to confine myself to these, and the following will give you a fair idea of the character of the country and its possibilities. Bloemfontein is a town about the size of Ararat, and for dust and wind I am inclined to think can hold its own against any other part of the world. The wind begins to rise about 7 a.m., and blows continuously till about 9 p m., always bringing with it clouds of dust. Possibly the frequency of these dust storms is more ascribable to the dryness of the season than to the natural condition of the country, as this district seems to be particularly unfortunate in that respect, no beneficial rains having fallen since February last. Speaking generally, from either a pastoral or agricultural point, the Bloemfontein district is the worst I have met with either in the Orange River Colony or Transvaal, and I have had good opportunities of seeing both, for after the battle of Diamond Hill we (Kitchener's Horse) followed the marvellous De Wet nearly all over the above-mentioned colonies, and as my duties were principally confined to scouting, I had the advantage of seeing much more of the country than otherwise would have fallen to my lot.

"What strikes an Australian most is the almost total absence of timber; this feature is most marked, and seems to be the chief characteristic of the country. The hills and mountains are bald, and some extremely rough and rocky. The country, both in the

Orange River Colony and Transvaal, varies very much in character, and consists of some of the finest pastoral and agricultural country you would wish to see, also some of the roughest and most useless.

"The good country principally consists of open plains with broken and undulating country intervening. The grasses seem of a good and fattening description, and for the most part there is no scarcity of it. Even the hills are fairly well grassed. The water supply is fairly plentiful throughout, and even in the parts where there is a shortage of surface waters, an abundant supply can be obtained by sinking almost anywhere at a very shallow depth.

"The soil, like the country, varies, but on the good lands it principally consists of red, black, chocolate and sandy loam, of great depth in most places. To even give a rough estimate of the area of good country would be a difficult matter, but from my limited experience I think I am safe in saying the land fit for occupation is almost unlimited, and in the near future, under proper management, will develop into a very valuable country.

"The sheep the Boers breed are the worst type of that animal I ever saw, in fact are more nearly allied to the goat than sheep. The cattle, in comparison, show more quality, but even they are rough and require heavy culling and the introduction of fresh blood before anything like creditable herds can be produced.

"The country north-west of Pretoria, and between that place and Mafeking, is very pretty, being fairly timbered and having a good backbone in the Rustenburg Range. Some truly beautiful country is in the valley of Crocodile River and in the valleys around the pretty little township of Rustenburg, where oranges, lemons and citruses are grown in great abundance and perfection, and I can tell you the troops enjoyed them when on the march. Out by the Drakensberg Mountains the country is very good, but not so well watered as that around Rustenburg, and is very sparsely timbered. The climate, generally speaking, is mild, dry, and for the most part exceedingly healthy. If the days are sometimes pretty hot, the nights are delightfully cool and clear, so that one can always get a good sleep. The foregoing should give you some idea of the country, its possibilities and conditions."

HACKNEY STALLION, HEDON SQUIRE.

Winner of Two Championships, Paris International Horse Show, 1900

The Property of Sir Walter Gilbey, Bart., Elsenham Hall, Bishop Stortford.

STOCK FARMING.

Hackney, Hedon Squire.

This famous English horse, whose portrait we reproduce, is thus described in the *Live Stock Journal*:—

"Many of our readers will probably like to see a portrait of the celebrated Hackney stallion Hedon Squire 4306, which has been engraved from a photograph taken by Mr. C. A. Tadman after his return from the International Horse Show at Paris, where he won the first prize and the two championships—namely, the grand prize for the best of all foreign light horse breeds, thoroughbreds excepted, and the champion prize for the best French or foreign horse. This grand specimen of the breed is the property of Sir Walter Gilbey, Bart., Elsenham Hall, Essex, and was bred by Mr. A. Fewson, Hedon, Hull."

The winning of these grand prizes must have been a pleasure to Sir Walter Gilbey, who for some years past has given great attention to breeding hackneys. It is a great advantage to get photographs of horses and other prize stock, as next to having them under the eye and hand, their usefulness as object lessons is afforded to a large number of students and enquirers, and others interested in stock breeding. We shall always be glad to obtain the loan of the photographs of stock, with short notes from owners, and we hope when times have quietened down to obtain a satisfactory supply of illustrations of our best colonial stock.—EDITOR.

Military Horses and How to Breed Them.

The following important article on the above subject by Mr. Duncan Hutcheon, M.R.C.V.S., Colonial Veterinary Surgeon, is taken over from the *South African Agriculturists' Year-Book and Almanac for 1901*; a notice of which will be found on page 371.

The South African campaign has given rise to a great deal of

discussion respecting the type or breed of horse best adapted for military purposes, more particularly the stamp of animal most suitable for cavalry and mounted infantry.

Sir Walter Gilbey, in his pamphlet on "Small Horses in Warfare," strongly advocates the breeding of small compact animals, between 13.2 and 14.2 hands high, these he says being the stamp on which most reliance can be placed for hard and continuous work on scanty and innutritious food. Be that as it may, every horseman will agree with his further statement, "that increased height in the horse does not necessarily involve increased strength in all directions, as greater weight-carrying power and more endurance." But he is somewhat reluctantly constrained to admit "that a good big horse is better than a good little one." Hence the speed, stamina and endurance of a horse, be he big or little, resolves itself into a matter of breeding, form and constitution.

Cape Horses.

In his reference to the Cape Horse, Sir Walter says: "that the universal opinion of residents in South Africa is against the introduction of imported horses for general work, inasmuch as they cannot withstand the climate, bad living, hard roads, and rough usage which make up the conditions of a horse's life in the Colony."

This statement is only partially correct, for—like the other—it depends entirely on the type or breed of animal that is imported. But even admitting that the large majority of English horses imported into this Colony during the last three decades are not so well adapted for the general work of the country, outside of the principal towns, as the native bred horse, that fact does not justify the statement, made on the authority of Mr. Rhodes, "that no infusion of English blood would enhance the powers of the small Colonial bred horse to perform the work required of him under local conditions; that although thoroughbred blood would improve him in height and speed, these advantages would be obtained at the cost of such indispensable qualities as endurance and ability to thrive on poor and scanty fare." Let us examine how this statement agrees with the history of the foundation and development of the Cape Horse. The foundation stock of the Cape Horse was of Eastern origin, and consisted mainly of Barbs, and Persian or Gulf Arabs, imported by the Dutch East India Company. By 1688—that is, twenty years after the settlement—the horses had increased in number to a satisfactory extent, but had deteriorated very much in character and appearance. In order, therefore, to improve this breed, the Company imported a number of Persian Arabs, and subsequently passed an Act prohibiting anyone from using a horse under three years of age.

In 1792, eight stud horses were imported from England. These are believed to have been of the early English Roadster or Hackney breed. In the same year five stud horses arrived from Boston, and the following year a number of horses and mares were brought from the New

England States, these are described as of Spanish, or Eastern blood. In addition to these, in March, 1807, during the Peninsular War, two French vessels were captured at the Cape, containing some Spanish horses *en route* to Buenos Ayres for breeding purposes It is said that from these were obtained the blue and red roans which were considered by the Colonists as so valuable for their great power of endurance. Such, then, is the origin of the Cape Horse, and his character at the date of the English occupation and for some time after is represented as that of a strong, hardy animal, deficient in size, substance and symmetry, but possessed of great power of endurance comparative to his size.

It was in 1813, however, that the dawn of a new era in Horse-breeding commenced at the Cape. In that year, Lord Charles Somerset was appointed Governor of the Colony, and soon after his arrival he directed his attention to the improvement of the Cape horse by means of the English thoroughbred, and during his term of office he imported a considerable number of first-class thoroughbreds, both stallions and mares. During the three following decades, first-class thoroughbreds continued to be imported by the leading horse-breeders of the Western Province, and the male progeny of these were distributed all over the Colony as stud horses. It was after these importations had impressed their character and qualities on the native-bred stock—from 1840 to 1860—that the Cape horse reached the highest stage of perfection which it has ever attained It was during the latter part of this period that large consignments of horses were shipped to India, which earned for the Cape horse such a high reputation with the Indian authorities. One old Indian Officer in writing of these horses said, "for an all round horse capable of standing hot and cold weathers in the open, and keeping his condition through it, commend me to the stamp of horse that was imported from the Cape during the Indian Mutiny." Colonel Apperley, writing of the Cape Horse in 1859, remarks, "I have a very high opinion of the present Cape Horses, particularly with reference to their fitness for the ranks of the Indian Army. The only complaint is their want of size, caused principally by starving the mares and foals." Compare this description with that of Veterinary-Colonel Nunn, who in his report to the War Office in 1887 describes the Cape horse as "small and stunted in growth, deficient in bone, pinned in at the elbows, good shoulders and forehand, narrow chest, very badly coupled and ribbed up, with bad drooping quarters, badly developed muscles of the croup and thighs, split up behind with crooked hind legs, the hocks being very far back. In fact the South African horse is, although small, good before but bad behind the saddle."

Now what were the causes of this deterioration in the character and quality of the Cape horse during the three decades following 1860? The first and principal cause undoubtedly was the wretched character of the large proportion of the thoroughbred stallions that were imported during this period. The marked improvement in the

breed of horses which was observed to follow when the Cape mares were crossed with the well-selected thoroughbreds which were imported during the previous decades, induced the farmers to use thoroughbred stallions largely, irrespective of their character or suitability, to mate with their mares, so long as they were animals possessed of pretty heads, fine necks, and a showy appearance, and their names could be traced in the stud book. Speculators who gauged the weakness of the Cape horse-breeders for such animals, went into the market, and purchased the sweepings of Tattersall's for a song, and sold them to the farmers here at exorbitant profits. Mr. Graham Cloete, Secretary of the S.A. Turf Club, wrote in 1892, "That over 500 English thoroughbreds had been imported into South Africa," and added, "I do not think that it is an exaggeration to state that not one-half of these importations were horses likely to benefit the horse-stock of the country, while the remainder had exactly the opposite effect." Is it any wonder, then, that the English Thoroughbred has been condemned as a sire suitable for improving the Cape horse, whereas the only improvement which has ever been effected in the breed has been by the introduction of the better class of thoroughbreds, and their proper mating with well-selected Cape mares. But I will revert to this subject later on.

The other cause of the deterioration of the Cape horse which has taken place during the last three decades, has been an ever progressing deficiency of food supply for the brood mares, and the young growing stock. At the commencement of the period referred to, more profitable pastoral pursuits began to be developed. Merino sheep-farming was rapidly extending over the whole Colony, and Angora goat-farming was likewise fast becoming an established industry, and shortly afterwards the taming and breeding of ostriches developed into a prosperous pursuit. As a result, horse-breeding was neglected except by a few of the old-established breeders, and even with them the pasture formerly reserved for the mares and foals was given over to better paying varieties of stock.

But how do these facts square with the opinion of Sir Walter Gilbey and others, who assert that artificial feeding favours delicacy of constitution, and recommend that to develop, fix and maintain a breed of light cavalry and mounted infantry horses, we must not only select pony mares "which have been accustomed to live on grass in the open air, exposed to all weathers, year in and year out," but we must treat their progeny in a similar manner in order to preserve these qualities; and further assert that "endurance, weight-carrying power, and speed maintained over long distances, are found at their best in the horse which has been reared under natural conditions, and whose stature has not been increased by selection, in-breeding, and by artificial conditions of life"! The question arises what is meant by "artificial conditions of life"? The highest art consists in the closest imitation of Nature, and the whole art of breeding, selecting and feeding animals for a definite object or purpose, consists in closely copying Nature's most successful methods in that particular

direction, and supplementing her efforts where they are likely to fail.

It may be quite true that under the trying conditions in which the hardy races of ponies are bred and reared in all parts of the world, "Nature erects her own standard for measuring the constitutional power of her creatures, and the individuals who no longer come up to this standard perish prematurely." But surely no sane person would, at the beginning of the twentieth century, recommend a return to natural selection in the formation and development of a superior race of light cavalry and mounted infantry horses; or maintain that the horses so produced would be superior in speed, stamina and endurance to those bred and reared under more favourable conditions, where their size, symmetry, speed and endurance could be developed and maintained by careful selection, suitable feeding and exercise, and the application of the necessary trials or tests.

Nature, by the application of that inexorable law, the survival of the fittest, has developed these respective breeds of ponies, modified their size, and endowed them with a constitution and power of endurance capable of withstanding the hardships and scanty fare to which they are subjected. But the same qualities can be developed and maintained in a larger breed of horses, and at much less sacrifice, by suitable treatment and an increased supply of food. It will not be contended, surely, that the best way to develop a sound and hardy constitution in a horse is to half starve him as a colt. Science and experience unite in teaching that unless a colt is properly fed and nourished when young, it will never attain its full development either in constitution, symmetry, or quality. Even the digestive organs, upon which every other character and quality more or less depends, may be ruined by being continuously distended with bulky innutritious food. I am well aware that good legs and feet cannot be properly developed in colts and fillies unless they are allowed freedom to take plenty of exercise, and it is a well-recognised fact that the horses and ponies which have to undergo the continuous exercise of climbing mountains, such as there are in Basutoland and other highland countries, the functional power of the heart and lungs becomes greatly increased, and such animals are correspondingly more efficient in a rough campaign. But it is surely possible to make arrangements to provide an appropriate artificial substitute for developing the wind and limbs of young stock.

But, leaving theory and argument aside, let us inquire how horses such as are now required for military purposes, have been bred. A strong opinion prevails amongst a great many Colonists that the Arab is the most suitable stallion for the production of such a breed. As some justification for entertaining such an opinion, it will be readily conceded that the strength and power of endurance so characteristic of the Cape Horse, is largely due to his Eastern origin, although—as already shown—it was the English thoroughbred which raised him to his highest point of excellence. Further, it is to its Arab foundation that the English thoroughbred owes its origin and distinction

as the finest race of horses in the world. But the success of the Arab in forming the English thoroughbred has been largely due to the climate, abundance of good food, careful selection of the best animals to propagate the race, and to the fact that at the time of the introduction of the Arab into England, the English mares with which he was mated were superior to any to be found elsewhere; and, last but not least, the severe test to which the thoroughbred is continually submitted in order to gain the winning-post on the race-course. The success of the Arab in forming the English thoroughbred is quite exceptional. In no other European country have the standard and quality of the modern breeds of racers, hunters, hacks, or carriage horses been raised by the Arab, although ample opportunity has been given them. The present improvement of these breeds of horses throughout Europe has been effected mainly by a large infusion of English thoroughbred blood. As Lehndorff says: "A cardinal point which continually maintains and regenerates the thoroughbred as a source of power and soundness, and places it with regard to certainty of propagation far above all other breeds of the equine race, is the circumstance that the thoroughbred is tried before it is sent to the stud; whereas of the half-bred, such individuals only as are unfit for breeding purposes are put to the test." "What—he adds—would become of the usefulness of our half-breds, what of our cavalry without a continuance of crosses with such stallions of pure blood, bred for stoutness, and chosen on account of their proper excellent qualities, so as to constantly renew the necessary steel in the blood."

"It is the test at the winning post that gives the English thoroughbred horse a value for breeding purposes unequalled, and looked for in vain, in any other species of animal in creation," and that this is no fancy picture is clearly shown by the fact that the English thoroughbred was the progenitor of the only two breeds of horses which come nearest to the standard of horse which the advocates of army reform are at present anxious to obtain, viz., the early English Hackney and the American Trotter. It will be of interest, therefore, to trace the origin and breeding of these two types of horses. The history of the early English trotting horse commences with Old Shales. This horse was foaled in 1765, his sire was Blaze, by Flying Childers; his dam a strong common English mare. He was the first noteworthy trotting horse of which there is any distinct record. It is a curious fact that Blaze is not of pure Eastern or Arab descent. Although entered in the stud book, he inherits a large proportion of English blood through his dam, the Confederate filly. It is quite possible, therefore, and very probable, that Blaze inherited a trotting tendency through his dam. It is rendered all the more probable, says Euren, from the fact that in the seventh generation from Blaze on each side, the re-union of the blood in Rysdyk's Hambletonian, the sire of so many fast American trotters, should have proved to be of the most impressive character.

Further, that celebrated horse Mambrino, the sire of Messenger, the father of American trotters, inherited an additional strain of

English blood, as will be seen by the following pedigree. Mambrino was got by Engineer, a son of Sampson by Blaze. Lawrence, as quoted by Euren, positively asserts that Sampson's dam was not a thoroughbred mare, but a good hunting mare about three parts bred, and his appearance indicated that he had some common blood in his veins. He is described as the strongest horse that ever ran, and Lawrence believes that at twenty, and perhaps fifteen stone, Sampson would have beaten over the course both Flying Childers and Eclipse, and have undoubtedly double distanced Bonny Black. It is recorded of Mambrino—the grandson of Sampson—that he could trot fourteen miles an hour, and showed excellent trotting form.

Writing of Messenger, the founder of the two famous strains—Mambrino Chief and Hambletonian—the taproots of the American trotting Stud Book, Mr. Leslie Macleod says:—"As to what degree of action Messenger possessed we have no evidence, but this much is certain, that he left progeny noted for their speed and endurance, and when in his descendants this road gait was developed and intensified by use, and as they were mated with a view to producing progeny superior in this special qualification to themselves, each generation naturally reached a higher plane of excellence than its predecessors."

"It has to be noted, therefore, that in the formation of the American trotter, Messenger and his immediate descendants were mated with the common stock of the country, which consisted probably of a certain amount of English blood, with possibly a certain mixture of the original Indian horse, and of the Mustang from Mexico with its Spanish origin."—(Marlborough.) In like manner, the descendants of Old Shales—who was by Blaze—were mated with good English mares, chosen for their trotting form and enduring qualities. The trotting horses of England and America were formed, therefore, by breeding a certain trotting strain of English thoroughbred blood on selected trotting mares of the respective countries, and the breeds were developed and maintained by selection. But while the American trotter has continued to improve both in speed and endurance, owing to the fact that all American trotting stallions require to have their speed and endurance tested on the racing track before their names are admitted on the register, the English registered hackney of the present day is not required to undergo any such test of his qualifications to be placed in the Stud Book. The majority of them are allowed to lead a life of sluggish idleness from the day they are foaled to the day of their death, generation after generation; hence the great deterioration which has taken place in the speed and endurance of the modern hackney, and the loss of his impressiveness as a sire for begetting first-class riding and driving horses, possessing these qualities. There cannot be any doubt, however, that the early English trotter or hackney was an admirable horse for general purposes; in fact, he possessed all the qualities of a perfect hack. He was a very compact, comparatively small horse,

from 14.2 to 15 hands, very active and docile, and capable of maintaining a high rate of speed for long distances, as the following records of some of their performances will show :—

Marshland Shales trotted 17 miles in 58 minutes, carrying 12 stone. A grand-daughter of Old Shales trotted 15 miles within the hour, carrying 15 stone; while Old Driver—her sire—trotted 17 miles within the hour.

Wroot's Pretender trotted 16 miles in one hour, carrying 16 stone; aad "Phenomena" in July, 1800, 17 miles in 56 minutes, and in the same month repeated the performance in 53 minutes. Her sire Othello trotted 18 miles within the hour.

Mr. Dixon's mare Nonpareil trotted 100 miles in 9 hours 57 minutes, and after resting an hour walked home 7 miles to her stable.

For further records of similar trotting performances, see Mr. Euren's historical introduction to the Hackney Stud Book. It was the rapid construction of railways that exercised the principal influence in causing a falling off in the breeding of the old style of hackney. Euren says: "Before the advent of the iron horse, it was the practice of farmers going to market to meet at cross roads, or at roadside inns, thence to travel a goodly company to market, returning at night in a similar fashion, it being then no unusual thing thus to ride fifty and sixty miles a day." But these long journeys, so common in the early days of the hackney, are not now required, and no test of the speed and endurance of the breed has been substituted for it; hence the purity of the breed only is recorded, but there is no definite arrangement made to test its quality.

As a natural consequence, while the modern hackney has been increased in size, and improved in symmetry, style, and fancy action, he has deteriorated in the qualities of speed, courage and endurance which are more essential for military purposes. It was the constant journeying on the hard roads, which he did so cleverly, admitting of no rival, that developed in the hackney that active nervous temperament, hard muscular conformation, and extraordinary powers of endurance, which characterised the breed, and these qualities can be reformed and maintained only by the same or similar treatment; the foundation is there all right. This is clearly shown by the fact that it is the test on the trotting track that has brought the American light harness horse to a point of excellence unrivalled by any other breed.

"His gradual gain in average speed has been from one mile in 2 minutes 42 seconds in 1820-1830, to a mile in 2 minutes 11 seconds in 1887."—(Leslie Macleod.)

My object in referring to all this is to show how good horses have been bred, in order to indicate how they may again be bred.

And if I have interpreted the matter correctly, the thoroughbred should be largely used as the foundation stock, and mated with the mares native to the country, chosen because they possess as near an

approach to the qualities desired as it is possible to to obtain; and if the substance, free action and endurance con be secured in the thoroughbred, I would be strongly in favour of repeating his use as a sire, until the breed became fixed; but the advantage or disadvantage of this will largely depend upon the character and quality of the mares which form the foundation stock. In any case, however, the sire and dam should be chosen, not so much on account of their breed or pedigree, but because their character, conformation and performance fulfil the requirements aimed at in the breed to be created.*

With respect to the advice of Sir Walter Gilbey and others, that in rearing the half-bred progeny of the foundation stock "they should be allowed to lead a free and natural life, and exist on the natural herbage of the country, in order to keep them small in size, and hardy and enduring in constitution," I quite agree that the young stock should have plenty of room to roam or gallop about, in order to develop their wind and limbs, and that they should also be trained and accustomed to feed on the natural vegetation of the country, to be able to take full advantage of it when it becomes necessary, but I do not see any advantage in limiting them to the natural vegetation alone, when it becomes deficient either in quantity or in quality. The desired size, symmetry and quality of the breed can be maintained by selection, and I have yet to learn that an abundance of plain wholesome food renders either a horse or a man less hardy and enduring when the time of stress arises—all experiences teaches the very opposite.

Further, I maintain that all the characters of speed, strength and endurance can be as easily bred into an animal of 15 hands as into one of 14, while the former is much more valuable and serviceable for general purposes than the latter, and will bring in a better return to his breeder. This latter is the crux of the whole question. A horse breeder, who has the means and opportunities, will breed the horse that pays him best, and amongst light horses, first-class riding and driving horses will always command the highest prices. There will always be misfits, even in the best managed studs, which have to be sold for military or similar purposes at a lower figure. But although these latter may not possess the size, fine symmetry, and nice quality of their more fashionably formed relations, there is no reason why they should not prove equal to them in speed, strength and endurance, the qualities required—if they have been bred on the same lines, and reared in the same manner.

A successful breeder of any class of stock, and more especially of horse stock, must have present in his mind a clear idea of the type of

* It must be clearly understood that, in advocating the breeding of first-class riding and driving horses that should possess all the qualities required to fit them for Cavalry and Mounted Infantry, on the lines above described, I do not wish to detract from the value and importance of all the modern breeds of horses, both heavy and light, which have their legitimate use in private and commercial life, as well as for agricultural purposes.

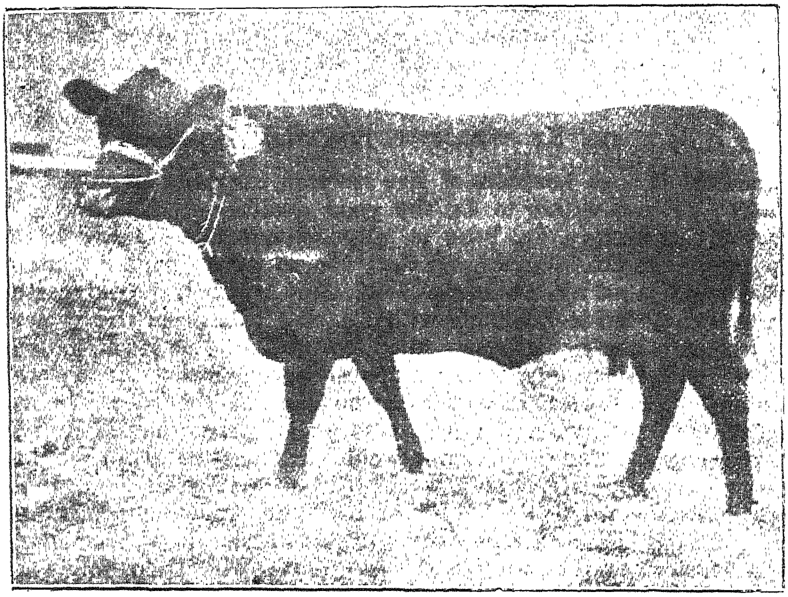
animal which he wishes to breed, and should possess a thorough knowledge of the means by which alone science and experience shows that such a type can be produced. The next consideration is to place such stock under the most favourable conditions for their growth and development, the most important consideration being a sufficiency of suitable nourishing food, and plenty of room for healthy exercise.

Having selected your foundation stock, chosen because they possess the characters and qualities which you wish to breed, or the nearest approach to the type that you can obtain, how do you propose to develop and perfect these characteristics, and maintain them after they are attained? Simply by following the same established principle or law by which every other breed or class of animals has been brought to perfection, viz., by the selection of none but animals which come up to the required standard for perfecting the breed; and as the essential qualities of the particular breed of horses under discussion are soundness of constitution, a high rate of speed, and great strength and endurance, the animals selected to be the progenitors of the race must be submitted to some adequate and appropriate test to determine whether they are really possessed of these qualities or not. The value of such a horse's pedigree, therefore, does not consist merely in a long record of purity of descent from some celebrated sire or dam many generations back, but is determined by what his ancestors have accomplished either on the racing track or on the road, and that the horse is himself a worthy scion of a distinguished stock. The size and conformation of the breed will regulate itself, if performance, and not pedigree alone, is made the test of merit. The size and shape that fulfil the test requirements best are the size and shape to breed. "It is the winners of races that become the breeders of racers," apart from his special form or symmetry. If a proper standard of merit is fixed, and an appropriate test is properly applied to determine whether all the animals selected for breeding purposes come up to that standard, the size and conformation will be governed by results. Artificial selection, when applied in this manner, is just as exacting as natural selection, but much more satisfactory, from an efficient and profitable point of view.

With respect to pace, extraordinary speed for short distances only would not be aimed at in the formation of such a breed, but it is necessary that the horse should have free and fast action when going at his natural pace, to enable him to maintain the speed required with ease and comfort for long distances. All experienced horsemen know that a horse with defective form, faulty action, and naturally slow paces, will become much sooner distressed and knocked up, when required to perform long marches at a fast pace, than a horse with the same stamina but possessing naturally free and fast action. Hence the necessity of selecting animals possessed of a high rate of speed, in addition to great powers of endurance.

With respect to the question whether the breeding of such a horse as I have endeavoured to portray could be more successfully and profitably undertaken by private individuals or by a Government, I unhesitatingly reply that such horses can be more satisfactorily and economically bred by private individuals, who thoroughly understand their business, than by any Government with its necessarily expensive management. But the breeding of ponies or small horses, such as are recommended by Sir Walter Gilbey and others, on the lines drawn out by them, and purely for military purposes, would not pay any one. Hence if it is to be undertaken at all, it must be done by a Government at the expense of the country.

Red Polled Cattle.



CHAMPION RED POLLED HEIFER, CHARMANTE.

This heifer was bred by, and was the property of, Lord Amherst, Brandon, Norfolk, and won the championship at the York Royal Show, 1900. At the Bath and West of England Show she was placed second, but at York she came out top with the addition of the Red Polled Society's champion prize for the best cow or heifer of that class. She is a fine specimen of the breed and well recommends it.

This comparatively recently established breed appears to be gaining in favour and increasing in numbers, being good stock both for beef producing and the dairy, with the additional advantage for the dairy that they are hornless, if, as claimed for them, they are on that account the more docile and less quarrelsome. It has been said that an ill-tempered or irritated beast will find some way of venting its rage, but horns are always ready to inflict serious or painful wounds, although it appears to be only a natural habit for them to be kept in constant exercise. However, this is a question to be decided by experience, and we shall be glad to hear what any of our stock farmers who have tried dishorning or kept polled cattle have to say on the subject.—Editor.

New Feature in Telegony.

The following remarks on the above subject are taken from the *Australasian* and were contributed to its columns by "Bruni," the well-known authority on stock farming:—

Breeders' Knowledge vs. Scientists' Theories.

Since the famous breeders of live stock in England employed the principle of in-breeding to fix the good qualities of the shorthorn breed of cattle, there has been no phenomenon connected with the breeding of the domestic animals that has caused so much discussion as that which goes by the name of telegony. When the old cattle-breeders employed in-breeding with a daring that is surprising even at the present day to fix certain good qualities in their stock, most of the scientists of that day declared almost to a man that the practice could have no other result than the ruin of the race. It was declared most positively, and with all the authority that a scientific standing confers, that in-breeding would infallibly result in the loss of constitutional power, that it would be followed by all the diseases to which cattle are liable, and that the race would certainly and shortly die out. The breeders of shorthorns took no notice of these warnings, and, to the surprise of the scientists and their followers, the in-bred shorthorns rapidly advanced to the front rank among the cattle of Great Britain, and that position they have held up to the present time. Indeed, it may fairly be said that they are held in higher esteem by cattle breeders throughout the world than any other breed. The opinions of scientists have been greatly modified since they made their first pronouncement against the principle of in-breeding. A closer examination into the subject has taught them what they might have learned of stock-breeders more than 100 years ago, that in-breeding in all animals may be safely practised as long as the animals are free from the taint of disease, and are of strong constitution.

Objectors to Telegony.

Telegony, which was known to the breeders of the domestic animals long before the name was coined, has met with the same reception as in-breeding at the hands of scientists. Professor Weismann, who, by the way, originated the name, is a firm disbeliever in the thing, and is reported by the London *Times* to have stated that if such a thing as telegony were possible we might breed from our mares, cows and ewes without the intervention of the male animal. Professor Ewart is almost as great a disbeliever in telegony as Professor Weismann, and he bases his disbelief on the fact that he has made a few experiments in breeding horse-zebra hybrids, and in breeding afterwards from the mare with a stallion he has not met with an instance of telegony. The experience of stock-breeders, who conduct more experiments in breeding during the course of a year than the Professor is likely to do in his whole life, has been quietly ignored or treated with contemptuous ridicule. I have made inquiries of many skilful and observant stock-breeders on the subject of telegony, and the result has been, in my mind, to place the matter beyond a doubt. The instances of telegony occurring in Australia are fairly numerous and of a most decisive character. In the records of stock-breeding in the motherland cases of telegony are frequently met with, and in no race of animals more frequently than among dogs. The old breeders of racehorses, who never heard of telegony, did not regard a mare as pure-bred after she had once produced a foal to a crossbred horse. They founded their belief on this subject upon the results of many years of racehorse breeding by themselves and their fathers. With that cock-sureness that marks the man who knows little or nothing of a subject, Professor Ewart terms this belief of the breeders of racehorses a "fad" which he intends to demolish. Indeed, if I am not mistaken, he thinks he has already demolished it, and he says he is going to give the *coup de grâce* to many other breeders' fads. It is a good thing to learn before beginning to teach.

Telegony Gone Mad.

The belief that the influence of a previous female may be exhibited as well as that of a previous male is described by Professor Ewart as "telegony gone mad," and yet there are a good many intelligent and experienced stock-breeders who believe in its existence. The stock-breeders of the United States were, so far as my knowledge goes, the first to announce their belief in the influence of a foreign female which had been served by a male upon that male's stock from females of his own breed. The first statement of this belief was generally met with outspoken incredulity, but I have been surprised to find the number of stock-breeders in America and Great Britain who have expressed their belief that the phenomenon was occasionally manifested in such a manner as to leave no doubt on the subject. Mr. W. Goodwin, Shropshire, writing

to the *Live Stock Journal*, November 16th, 1900, gives the following instances of this form of telegony. He says :—"I have a herd of the purest-bred small white pigs, which have never showed a spot of colour until the boars were allowed to serve Berkshire sows, after which many of the young came spotted and marked, and one with a black nose. In like manner, a friend who had a choice herd of black Essex pigs, of which he was particularly careful, had to his dismay several litters of young pigs spotted with white after he had allowed a neighbour's white sow to visit his boar. The same noted breeder, who, to show his standing, was at one time part-owner of the 1,500 guineas bull Eighth Duke of York, had a chestnut pony sire which, after serving a gipsy's skewbald mare, produced a foal with skewbald markings out of a brown mare, which had previously borne several self-coloured foals to him. Another instance I adduce, that of a high-bred herd of shorthorn cows which were kept on a gentleman's estate at Hales Hall, where a Jersey cow was also kept for the use of the house till it was noticed that the calves sired after the service of the Jersey were born with brown noses, and this, as I saw myself, was the case after the use of two different bulls." In all instances of telegony it is only the very marked cases that are recorded. Many slight influences doubtless occur, and are, through the want of observation on the part of the stock-breeder, passed unheeded.

DAIRYING.

Famous Milch Cows.

Under the heading "What an English Cow can do" the *Rural Times* gives an account of the following recorded feats at the pail credited to some English dairy cows of the past :—

Many years ago we engaged in a controversy with the late Mr. Dudley Miller, the great American breeder, who championed the Holstein-Frisian, or Dutch, cattle of the United States, and who declared that some animals known to him, or possessed by him, produced quantities of milk and butter which were quite beyond the comprehension of breeders on this side of the Atlantic.

From that day to the present no such animals have been exhibited or tested in public trials in England, but we have recently produced a cow of Shorthorn type which has gone a long way to place English records by the side of the biggest which America can produce, and there can be no doubt whatever about the authenticity and truth of the figures.

At the London Dairy Show a special prize of £30 was offered by a member of the English Jersey Cattle Society for the cow, regardless of breed, which produced the greatest weight of butter at two of the three shows at which butter tests are conducted—that of the Bath and West of England, that at Tring, and the London Dairy Show. The last-named exhibition was the third on the list, and at Islington, therefore, the prize was decided. Eleven cows were in competition, eight of which appeared at the Dairy Show. Of these eight the largest yield was that obtained from the only Shorthorn in the competition, the remaining cows being, with one exception—and this was a Welsh—Jerseys. The Shorthorn cow was known as "Cherry," and she produced 2lb. 5¼oz. of butter, a figure which has often been exceeded, but which, considering that she had milked 104 days and that she was eight years and eight months old, was more or less extraordinary. She gave 5½ gallons of milk, and in this respect was beaten by other animals which had more recently calved. Cherry's great merit, however, is in the fact that at Tring, since calving, she produced 4lb. 4½oz. of butter, so that at her two tests she produced 6lb. 9¾oz., or 2lb. 2oz. more than any other animal. At Islington she did not produce extraordinarily rich milk; the quality, it is true, was slightly above that of the average Shorthorn, but slightly more than 2¼ gallons were required per pound of butter. If at the time of the Tring test she was capable of producing as much butter on other days as she produced under the test, her weekly output would be 30lb., equal to 40s. a week for butter alone, quite apart from at least a guinea a week for the skim milk.

We have referred to this case for the special purpose of pointing out to the breeder of dairy cattle what it is possible to do. A cow of this kind should prove a gold mine to some fortunate individual. Such cows should be mated, if we may be pardoned for suggesting the point, with bulls which are themselves the sons of the best milkers which exist, and as far as possible they should combine, with their milking blood, form and type, so as to perpetuate the Shorthorn character with the milking power. We are acquainted with the history of another cow which has been utilised in this way, and already not only has she produced milkers of the first rank, but bulls which are being utilised in different herds in the way which has been suggested. There are great possibilities if owners of great milkers will embrace them, and especially if breeders will take the pains to trace these cattle and obtain breeding stock from them. A cow like Cherry ought not to pass out of the world unnoticed. Her calves should be registered in a milking herd book, which ought to exist, and their histories traced, as the histories of similar cattle have been traced in the United States, for a generation. Cattle of the Jersey breed were exported to America many years ago, which were the foundation of the great milking power of the American Jerseys. It is now possible to tabulate the heifers produced by individual cows of this blood which have exceeded fifteen and twenty pounds of butter in a week. These cattle are still recognised by all

breeders, and their blood is sought for wherever milking blood is appreciated. Why should it not be the same with the best of our cattle in this country? Cherry is worthy to be placed by the side of Mr. George Long's Nancy, now passed over to the majority. This cow reached 1,500 gallons of milk per annum, and on the day before her death she yielded 66lb. Nancy was the champion at Islington in 1898 and 1899. She was the produce of a very deep-milking Shorthorn and of a Jersey bull of exceptional dairying character. If those who can afford to pay for good cows would make a point of selecting the best which could be obtained and mating them with the best bulls at command, they might depend upon producing breeding stock and milking performers of the highest order.

Milking.

We are indebted to the *Agricultural Gazette* of Tasmania for the following translation (with sundry alterations) of a useful article that appeared in the Swedish paper, *Sydsvenska Dagbl. Snallposten* :—

Milking the cows is a work that is generally not very highly thought of; the maids who do the milking on the large estates or farms are regarded as nearly a caste of their own, standing considerably lower than the other servants of the farm or estate, and when a female servant seeks a service at a small farm, whose owner cannot afford to keep a servant, especially on purpose to do the milking, the applicant often makes a condition for accepting the situation that she must not have to do the milking—not because this seems to her too hard work, but because it is too menial. Other people would regard it as a degradation on her part, she fancies. The farmer himself pays, as a rule, little attention and interest to the work of milking. To do it he takes the first best he can get, and leaves it afterwards nearly entirely to themselves to do the work as best they choose or understand. One must be glad to get somebody to do it, we must not be so very particular how it is done. Often the farmer himself does not understand much of the matter; how the milking ought to be done, or the great importance that it should be well done. This contempt for the work of milking, this want of interest for, and this ignorance about, such an important work, is much to be regretted. For why should this work more than any other respectable duty be thought degrading? It is one of the most important works of the farm, and the way it is looked to and executed is in many respects of great consequence. It has a great influence on the milking power of the cow, upon both the quantity and quality of the milk and butter, upon the health and condition of the animal, and so on, not to mention of what great importance it is to us in sanitary regard, that the milking is performed with greatest cleanliness possible, and in a manner that answers to the demands of hygiene.

In Denmark the farmers have of late begun to pay more attention to this matter, and have already been able to do not a little towards improvement. Milking matches have been arranged all over the country. Some competent person, with perfect knowledge of the matter, has given short lectures regarding the importance of the milking being well done, and how it is best performed. The "Svendborgs Amts Landokonomiske Selskab" (the Agricultural Society of the County of Svendborg) a couple of years ago arranged a competition for writing a short and popular article about the work of milking. That of Mr. Jorg. Petersen, headmaster at the Agricultural College of Dalum at Tyen, got first prize, and some thousands of copies were printed. In Praesto amt (Denmark) there has been formed an "Association for Promoting the Work of Milking." No doubt in this, as in other cases, the plan of co-operation is the one to lead to gaining the end most speedily and surely. It is not long since this Association was formed. Its aim is shown by its name. The Association will by all appropriate means try to counteract and remove the objection against milking as a degrading work; it will also arrange milking competitions, distribute short instructive articles on the subject, arrange lectures, and so on, and thus by every means seek to educate and encourage brisk and qualified milkers, who understand their work and are interested in it. Chiefly according to the before-mentioned pamphlet by J. Petersen, we will now see how that work ought to be done.

It is a general rule, appropriate to all living beings, that the use of an organ of the body promotes the development of that organ; this rule is thus also appropriate to the organ of the cow which we call the udder. The use of it is the milking, and in that we have the most important and best means of developing the udder of the cow, and at the same time also her milking power. But in order that the use of an organ may produce a higher development of it, it is also required that it shall exert the organ. The exertion of the udder consists of milking it perfectly free from milk. The milker must take as an example the greedy calf, which sucks the very last drop of milk out of the teat. This causes an increase of blood to the glands of the udder, and this is evidently of the greatest importance, knowing that it is from the blood all material for further development and for more milk is got. But, above all, is evident the importance of clean-milking young cows or heifers, the udders of which are still growing and developing. What a good milker has to do, is not only to get out all the milk that is in the udder, but also to do that in such a manner that the cow feels it as a pleasure, and further to take care that no dirt or impurities get into the milk.

Before beginning milking, the milker ought to speak kindly to the cow, pat her and caressingly smooth her along the belly and the udder. The milk pail is then placed under the udder on a certain side of the cow, and, with full hand, he takes hold of two of the teats, one fore and one hind teat to be preferred. The hands are alternately moved upwards to the udder by a gentle pressure, and

then, also alternately, slowly and lightly, closed downwards round the teat. These grasping movements are continued till he perceives that the cow yields the milk, when the latter is got out of the udder in long, consistent streams; the movements of the hands are the same as at the beginning, only a little more vigorous. For every new movement the hand must make a pressure up against the udder, and, at the same time, the thumb and forefinger shall seize the part of the udder which is next above the teat in order to get as much milk as possible from this part where the milk reservoir is the largest.

During this part of the milking the conscientious milker must give all his attention to his work, for every interruption in it means loss of milk. All noise and loud conversation must, therefore, be strongly forbidden during the milking, as disturbing to both cow and milker. When the first pair of teats no longer yield any milk, he proceeds in the same manner with the second pair. The milk must be squeezed, not pulled, from the teat. The latter must, therefore, as before mentioned, be taken in the whole hand, which must not more than absolutely necessary glide along the teat. "Streak-milking," by which the upper part of the teat is squeezed between the thumb and the forefinger, or worse still, between the forefinger and the middle finger, and then the fingers, tightly pressed, drawn downwards, is very objectionable. It is disagreeable to the cow, irritates the skin of the teat, and may easily cause sores; but not only that, it may even cause bursting of the mucous membrane of the milk-duct, and thereby cause a serious illness in the udder. A hard-handed milking often causes perturbations in the secretion of milk; in that way a cow may, for instance, become hard milked; a teat may from the same cause easily be made quite useless, and the cow become what is called three-quartered.

But milking the cow is not yet completed. An effective after-milking must take place, by which the milker by means of suitable manipulations must work and knead the udder to press the last drops of milk out of the teats. A great many examples could be told about the influence of clean-milking upon the quantity and quality of both milk and butter. In Germany the experiment has been tried of allowing one person to milk five cows during fourteen days, and then another person milk the same cows during the following fourteen days. The cows were fed and served during the whole time in quite the same way. The result, however, was that the second person at an average got about 2 kilograms (4lb. 6½oz.) more milk per animal per day than the first one. At a similar experiment made in America by Professor Badcock, Wisconsin, three cows were milked during a week by one person, A; the following week by another person, B. From the milk A received during this week 11.8 kilograms butter was churned, whilst from the milk B got, only 9.8 kilograms butter was produced, a difference thus of 2 kilograms.*

This result is not only owing to the greater quantity of milk

* A kilogram equals 2·2 lb. avoirdupois.

received, but more still to the fact that the last drawn milk is by far the richest. That this is the case anybody might easily ascertain for himself by pouring the very first and the very last drops of milk from the same teat into cream tubes. When comparing the tubes after the cream has risen, he will be surprised at the great difference in the thickness of the layers of cream; the milk first drawn looks, judging from the layer of cream, like good skimmed milk, the last milk drawn is more like thin cream. Through an experiment tried at an agricultural school in Denmark it was found that the first streams of milk contained only 0.6 per cent. fat, while the last strippings of milk from the same cow contained as much as 10.2 per cent. of fat.

A thoroughly clean milking, therefore, is very important, not only as a means of developing the milking power of the cow, but also for producing richer milk. And the milker who does not give himself time thoroughly to milk the cow clean, either does not understand his duty or does not care to carry out his work conscientiously. It is important also how often the cow is milked daily. Some experiments concerning this question have also been tried which show that the more times a day the cow is milked the more and richer milk she yields. But whether one milks three times or only twice a day, the intervals between the milkings must, as far as possible, be of the same length. The cow is in a very high degree dependent on habit, and its udder works even and regularly. The milking hours, therefore, must be carefully observed, and the same persons must every time, in the same course, milk the same animal. If the milking is begun too late, the cow becomes uneasy, and the tension of the udder causes pain to the animal—in both cases loss of milk ensues. The fact that the quantity of milk is lessened by milking less frequently and less energetically is a thing of which one avails one's self when wanting to dry a cow. But even in this case it is a bad plan to clean strip the udder; it is by far preferable to milk less often, finally only once every other day, every third day, or more seldom still, till the cow gives so little milk that the milking may be dispensed with altogether. During the beestings period it must be considered not only wrong, but often even dangerous to milk such cows hard which show any disposition for milk fever. According to examinations made by a famous Danish veterinary surgeon, this disease is caused by an increased activity in the udder, which must be considered still further increased by energetic milking. But with the exception of these two periods—when the cow is being dried and when she gives beestings (first milk)—she can scarcely be milked too hard, that is, too often and too energetically.

The milker must pay great attention to the cleanly condition of the udder and the teats. If he observes knots or tenderness in the udder, sores on the teats, the milk-canal stopped up, or the milk having an unnatural appearance, etc., he must at once tell the foreman. Diseases of the udder and teats often being contagious, cows in that way infected must always be milked the last, and the

milk from the affected part of the udder put into a special vessel and destroyed, in order to hinder further spreading of infection. The milk-canal in the teat is sometimes very tight (the cow being what is called hard to milk) or often shows an inclination to get stopped up. To use a straw, or such like, to widen and "cleanse" the canal is very bad policy, because in that way inflammation of the corresponding part of the udder might easily follow. A teat which has a stopped milk-canal must first carefully be worked or kneaded between the palms of the hands, and then carefully milked clean. A heifer is often sensitive to the milking manipulation, and this sensitiveness will sometimes last until she gets older; in this case the milker must be still more kind and careful at the milking; and means of restraint or force must be used only in case of great necessity.

Needless to mention, the greatest cleanliness must be observed at the milking. It would be desirable that every milker had at least two milking-gowns of washing material, in order that he or she might, at least every Sunday morning, appear in a clean milking dress Since the milking ought to be performed with bare arms, the gowns should be made with short sleeves, and in a way that they might easily be slipped on over the usual clothes.

All milking-vessels must be kept scrupulously clean, and should be made of tinned iron-plate, and must not be allowed to get rusty. Before each milking the hands should be well washed, and also during the work—between milking different cows—they should be dipped in clean water and wiped as often as needed. For the sake of cleanliness the milking must be performed with dry hands; to moisten the teats with milk as some milkers do is very dirty, and ought to be strongly condemned. It is the duty of a cowman to keep the animals well cleaned. If the udder be dirty it must be washed with tepid water and well wiped with a towel before the cow is milked. Milk is very apt to absorb gases, and it is of great importance that the atmosphere in the cow-house, especially during the milking time, should be kept as fresh and pure as possible. Feeding and, of course, cleaning out the shed must never take place during the milking. The milking vessels when the milk is strained ought not to be placed in the cow-house, but outside in the pure air. Light not only promotes the inclination for cleanliness and work, it also purifies the air. A cow-house which has plenty of daylight and, during winter, is well lighted morning and evening by good lanterns, gives the best guarantees for a good and cleanly milking.

HORTICULTURE.

Western Province Board of Horticulture.

The quarterly meeting of the Western Province Board of Horticulture was held in the Committee-room of the Legislative Council yesterday. Mr. C. Kohler was elected to the chair, and the other members present were: Messrs. C. P. Lounsbury, W. van der Byl, H. Meyers, P. R. Malleson and C. Mayer (Acting Secretary).

A letter was read from the French Consul-General acknowledging with thanks the receipt of the letter from the Board conveying to him a vote of thanks for the great interest he had taken in getting the duties reduced on fresh fruit imported into France from this country.

Importation of Trees.

A letter was read from the Agricultural Department with regard to the proposed regulations for the importation of trees, plants, etc., and asking whether the Board had any amendments to propose. Special attention was drawn to clause 5 of the proposed regulations.

After discussion, it was resolved to reply that the Board had carefully considered the present state of the fruit-growing industry, and believed that clause 5 was absolutely necessary with the amendment contained in a resolution of the Board some time ago, to the effect that the importation of peach stocks and peach stones be absolutely prohibited from the United States and Canada.

There was another letter from the Agricultural Department saying that it had been suggested that the Government should follow the example of certain Australian colonies, by restricting the importation of fruit trees, plants, etc., to one port, viz., Cape Town, so as to minimise as far as possible the danger of introducing into this colony new diseases.

It was resolved to reply that the Board fully agreed that that should be done.

Prizes at Wine Shows.

A letter was read from the Secretary for Agriculture showing that the present system of the Government giving all the money for prizes at Wine Shows was done away with, and promoters of such shows wishing to obtain a grant must do so in accordance with the regulations, which provided that associations could secure from the Government five-eighths of the prize money, the associations contributing the remainder.

After discussion, it was resolved that the matter stand over for consideration at a special meeting, on the return of the secretary (Mr. Persse).

Election of Board.

The Acting Secretary drew attention to the fact that the present Board was elected until June next, and that a new Board would have to be elected after their next meeting, first Friday in June.

Resolved that the matter be considered at a special meeting on the return of the Secretary.

Pulped Fruit.

Mr. Van der Byl brought to the notice of the Board the matter of disposing of the second-class fruit by exporting it as pulped fruit. The second-class fruit was a very serious item, as with many farmers half the crop was second-class fruit. What he suggested was, that the Horticultural Board should try to make some arrangement for inquiries being made as to whether some persons could not be got to start canneries, factories, or something of that kind, for the making of pulped fruit. Mr. Van der Byl pointed out that the jam factories were so overstocked that nothing like a reasonable price could be obtained by the fruit-growers for their produce.

After discussion it was agreed that the Board ask the Agricultural Department to make full inquiries through their agents in London as to the quantity of pulped fruit likely to be taken by the European markets, and also to get full information about the cost and best sorts of pulping machinery.

Railway Matters.

Mr. Malleson drew attention to the awkward position in which fruit-growers were sometimes placed, owing to the railway officials accepting consignments of fruit, and then having it stuck on the road. He proposed that the attention of the General Manager be drawn to the fact that it was better to refuse to accept fruit than to accept it, and then have it stuck on the road.

It was pointed out that the effect of such a communication would probably be that the railway officials would become over-cautious, and by refusing to accept fruit when it might possibly get through, seriously inconvenience fruit-growers.

Mr. Malleson therefore withdrew his proposition.

After discussion, it was agreed, on the motion of Mr. Malleson, that the attention of the railway authorities be drawn to the fact that this year the promise as to providing extra help at the station during the fruit season had not been carried out.

Fertilisers.

The Secretary read correspondence showing the good results accruing from the system whereby he, on behalf of the Board, secured a guarantee for fertilisers at fixed prices for associations represented on the Board. An instance was mentioned where it had been discovered that the fertiliser offered was much below the guarantee.

Mr. Van der Byl also pointed out that on going to a firm in town, he had been asked to pay £5 5s. for the same fertiliser that could be obtained through the Board for £3 9s. That showed the benefit of co-operation.

The Chairman expressed, on behalf of the Board, their thanks to Mr. Mayer for the manner in which he had looked after their interests in regard to these fertilisers.

This concluded the business.

On the Influence of Early and Late Pruning on the Productiveness of Vineyards.

The general tendency of Colonial vine-growers is to do a portion of their pruning, locally known as "schoon snei," early in autumn, almost immediately after the vintage. This system is presumably the outcome of conditions prevailing at the time when most farmers had still large and extensive vineyards, and had to arrange their work in such a way that they could find leisure to attend to other farming operations immediately after the rainy season had commenced. In any case, this early pruning has so far attained the sanction of time that hardly anyone doubts its suitability, though it is contrary to the knowledge we possess in respect to the requirements of plant-life. We know that for the production of fruit, plants not only require a certain amount of nourishing ingredients in the soil, but also obtain a considerable amount of food by means of their leaves from the air. By removing, therefore, green leaves in large numbers prior to the leaves having attained their natural maturity, as is done by early pruning, we deprive the plants of so many feeders which necessarily decreases their vitality as well as their productiveness. The truth of this may be seen from the results hereunder attached, the outcome of an experiment extending over a period of six years and conducted in the South of France.

33	vines	Alicante	Bonschet	pruned	in	November	yielded	300	lb.
36	,,	,,	,,	,,	,,	January	,,	244	,,
36	,,	,,	,,	,,	,,	March	,,	316	,,
28	,,	Clairette		,,	,,	November	,,	336	,,
28	,,	,,	,,	,,	,,	January	,,	360	,,
28	,,	,,	,,	,,	,,	March	,,	394	,,

The corresponding period for us would be about from end of March to end of August.

To grasp more readily the importance of this influence, it is necessary to refer to the differences as would result from late and early pruning if done on a large scale and the vines bore all in the same ratio. Calculating, therefore, on a morgen of vines at 5 by 5

feet, the early pruning would yield between 35 to 36,000 lb., whereas late pruning would produce from 37 to 38,000 lb., equal to an increase of about 1½ leaguer.

In the case of the second variety the difference would be more marked still, as early pruning would yield 51 to 52,000 lb. of fruit and late pruning about 60,000 lb., equal to a difference in favour of late pruning of nearly 9,000 lb. or between three and four leaguers of wine.

In the face of such results late pruning commends itself to the attention of farmers.

C. Mayer,
Agric. Assistant.

Stellenbosch, March 3rd.

Horticulture and Viticulture in South Australia.

The following particulars relating to horticulture and viticulture in the Colony of South Australia for the year 1899-1900 are taken from the Agricultural and Live Stock Statistics of that Colony, a copy of which has been recently received at the Board of Trade through the Agent-General.

Horticulture.—The prefatory report states that *orchards and gardens* have been so extended that the area now utilised amounts to 24,001 acres, an increase of 56 per cent. during the past ten years. The additional land devoted to horticulture has been almost entirely in the planting of orchards, which now occupy 15,477 acres, or 77 per cent. more ground, whilst the area under gardens is nearly one-third greater. Activity in horticultural operations is evidenced by the addition of 1,611 acres, the ground so worked having increased from 22,390 acres to 24,001 acres during the past twelve months.

Orange trees have doubled since 1891, the actual number now being 112,165, the number of trees added during last season amounting to 5,491. The number of oranges gathered was 36,990 cases, against 27,520, or an increase of 9,470 cases. About one-eighth of the trees having only been planted during the last four years are not yet in bearing.

Lemon trees were returned for the first time in 1898, and showed the unexpectedly large number of 54,124, being slightly over half that of orange trees. The return for 1900 gives 63,838 trees, or an increase of 9,714, compared with an increase of 7,553 orange trees. There is a large and increasing demand for this fruit, so essential to health in a warm climate, and it may be some years before South Australia is independent of foreign supplies. Attention to the growth of this valuable fruit has only been given in recent years, so probably three-fourths of the trees are as yet unproductive.

The number of cases of lemons reported is 13,975, against 6,860, an increase of 7,115 cases, or more than double returned in the previous year.

Almond trees, for the growth of which the soil and climate are equally favourable, have chiefly been planted in gardens as an ornamental or shade tree, their commercial value not having received much attention. The trees are fairly productive, the nut is of good quality, and such limited quantity as is made available commands a ready sale. The number of trees is 138,255, as against 130,801, or 7,454 more than in the previous year, the produce being 2,652 cwts., or 1,327 cwts. increase.

Olive cultivation has for many years been carried on, the climatic conditions, nature of the soil, and the introduction of the best varieties all tending to the success of a highly remunerative industry in the production of fruit and oil of the best quality. The number of trees returned is 61,577, against 57,337, an increase of 4,240, and the quantity of oil expressed 4,865 galls., as against 3,180 galls., or 50 per cent. more, the season being favourable.

Fruit preserving, canning and drying are important industries carried on under the most approved methods. The supply of locally dried raisins, currants, apples, apricots, peaches, and other fruits is sufficient for the demand, whilst the quality is generally excellent. In 1899 the value of dried and preserved fruit imported amounted to £28,504 as against £36,484 in the previous year, whilst the exports amounted in value to £20,490 and £31,120, local products representing £5,021 and £4,934 in the respective years. The value of the imports of jams and preserves was £9,954 against £9,130 in 1898, and of the exports £18,035 (£10,063 of which represented the value of domestic produce) as compared with a value of £19,664, including £12,523 of domestic manufacture in the previous year. Fresh fruit to the value of £22,770 was received, as against £30,330 in 1898, whilst the value exported was £36,405, of which £32,842 was of local growth, a considerable increase on the preceding year's transactions, when the figures were £26,830 and £22,211 respectively.

Bee-keeping is another industry which affords light employment to an extent not generally known, and is widely spreading where the climate and flora are favourable. Information respecting this industry was first obtained in 1891, when it was found that 500 tons of honey were gathered; the next year, 200 tons; in 1896-7, 400 tons, from 17,553 hives; and in 1897-8 only 70 tons from 9,692 hives, so unfavourable was the season. In 1898-9 the conditions were more favourable, 14,081 hives were reported, an increase of 4,389; and the produce, 400 tons of honey (value £12,000), as against 70 in the previous year. The season 1899 appears to have been a bad one, the number of hives being reduced to 12,182, and the yield of honey to 230 tons, of the value of £7,000.

South Australian Wattle Bark has always held a high place in the market for tanning materials. Until prices became greatly reduced some ten years ago, large quantities were stripped and exported. For a long period the industry has been depressed, but of late better values have induced greater activity, giving employment to numbers of strippers, and a welcome contribution to the farmers' income and to the staple exports of South Australia. Plantations have been laid out successfully, and more steam grinding mills have been erected, employing many hands. The quantity of bark stripped was 8,038 tons compared with 8,217 tons in the previous year, and 3,131 tons in 1892-3. The quantity exported in 1899 was 8,953 tons, value £69,985, against 8,206 tons, value £62,132 in 1898, and 5,704 tons, valued at £39,665, in the previous year. During the decade 1890-99, shipments amounted to 56,224 tons (the value being £470,707), of which 18,873 tons (valued at £198,462) were exported during the first, and 37,351 tons (value £272,245) during the second five years of the period.

Viticulture.—Vine-planting was so vigorously proceeded with during the first half of the decade that the area under vines more than doubled, and at present the acreage is nearly threefold what it was in 1890, when there were 7,352 acres with 3,260,747 vines in bearing, and 1,009,186 non-producing.

The total area under vines is 19,438 acres, against 19,159 acres in 1898, showing an increase of 279 acres. The number of vines in bearing is 9,032,083, compared with 8,814,086, or an increase of 217,997, the number not yet productive being 1,310,948, against 1,355,014, or 44,066 decrease. The quantity of wine made from the vintage of 1899, inclusive of that made by wine makers as well as that by growers, was 1,342,960 galls., compared with 1,263,988 galls. in 1898, an increase of 78,962 galls. only, owing to the dry season. At the commencement of the decade the production of wines amounted to 1,052,086 galls., increasing in 1897 to 1,898,105 galls., or nearly double in seven years. The two last vintages suffered severely from deficient rainfall, frost, and other unfortunate circumstances. Grapes returned as sold, chiefly to wine makers, amounted to 108,046 cwts., as against 128,608 cwts., a decrease of 20,562 cwts., again the result of an unfavourable season. Two tons of wine grapes, or from three to five tons of table or raisin grapes, are considered a fair average return per acre.

Board of Trade Journal.

MISCELLANEOUS.

The South African Agriculturists' Year Book and Almanac for 1901.

This annual is quite up to the standard of the previous numbers of this useful publication, and justifies its title to be called the Cape Farmers' Own Vade-Mecum. The place of honour is given to an excellent paper by Mr. Duncan Hutcheon, Colonial Veterinary Surgeon, on "Military Horses, and How to Breed Them," which we insert in this journal. This is followed by a concise and practical paper by Mr. S. B. Hollings, on "False Packing of Fleeces." The same author has another excellent illustrated article on the evolution of the "Cross-Bred Sheep, and its Effect on Prices," etc. There is a very instructive article on the "Production of Vinegar" by Mr. C. Mayer; and a very comprehensive article on "Are Manufactures Necessary to the Progress and Development of Cape Colony; should they be protected and how?" by Mr. T. Bagnall. The "Influence of Manure on the Production of Mutton" is exhaustively treated by Mr. Wm. Somerville. The popular Orpington fowl is described in a most interesting and instructive paper by Mr. George Bradshaw. There are also articles on Protective Inoculation against Anthrax; Application of the Tuberculin Test; Eradication of Scab; Dairy Industry and the Contamination of Milk during Transit; The Disposal of Sewage; Agricultural Settlers on Cape Flats; Malarial Fever in the Dog; Shropshire Sheep; Tick-Destroying Experiments, etc.; and a description of Mr. Mellish's Stud Farm, Vrede Hoek, with numerous short paragraphs containing condensed information on all sorts of subjects interesting to farmers and stock-owners. It is sold at the low price of one shilling and published by the *Wynberg Times*, Cape Town.—EDITOR.

Pyrethrum, or Persian Insect Powder Plant.

We have lately received from an esteemed correspondent a most satisfactory report of a trial of this very useful plant, and we wish that its cultivation was more general throughout the Colony. He writes:—

"The insect powder plant seed you and Prof. MacOwan sent me has been a great blessing, especially in the dairy. One time in the summer months it used to be all but impossible to make butter on account of the flies, but now, it is all pleasant work. The servant grinds the dried flowers in a coffee mill, and dusts the windows, and then shuts the door and waves a cloth or broom about to drive the

flies to the light. In half an hour she has a dust-pan full of dead flies, and the effect of one dusting will last for about a week. It is splendid for setting hen and young chickens, to rid them of vermin."

We have distributed the seed of this plant at different times for the last twenty years or more, and have had most favourable accounts of its growth and usefulness. It does not flower till the second year of its growth, and then lives as perennial root-stocks enlarging by side shoots for many years.

Anyone about to cultivate it should be careful to get the true plant. Some time ago, we found the plant golden feather was mistaken for it, and though somewhat of an insecticide is not at all comparable to the pyrethrum. As there may be some little difference in the mode of cultivation suitable to different parts of the Colony, we would like to get some notes of the plan our correspondent adopted.—EDITOR.

The Camphor Industry.

Considerable interest has been shown during the last few years in the production of camphor and camphor-oil, partly owing to the increased demand for these products in the arts, and partly as the result of the restricted output of these substances, which was the immediate consequence of the cession of Formosa, with its extensive camphor forests, to Japan.

Although camphor is still produced in China and Japan, and the cultivation of the camphor tree has been commenced in Florida, yet practically the world's supply of this commodity is derived from Formosa. In this island the distillation of camphor has been carried on from the earliest times by the natives, but in the 18th century the Chinese Government established a monopoly, any infringement of which was visited upon the offenders with savage penalties. In 1720, over 200 people were executed in the island for such offences, and so badly were the aborigines treated that they rebelled, and finally the right of production was declared free, the Government reserving the right of buying all camphor distilled in the island, at a fixed price. The arrangement lasted until the opening of the treaty ports, when European traders refused to recognise the monopoly and began to trade directly with the native distillers. This procedure was resented by the Mandarins, and much trouble ensued between the Chinese and the Europeans. Finally the monopoly was completely withdrawn in 1868.

Since that time the industry has flourished, and has gradually extinguished camphor production on the Chinese mainland and in Japan.

As a natural result of this unrestricted trade, the forests have been worked in such an improvident fashion that they would have been exhausted in a few more years. The restrictions on the output which

have so far been the most remarkable feature of the Japanese administration are, therefore, to a certain extent justified by the condition of the forests. The island has now been divided up into six camphor districts, each being controlled from a central office, which issues licences, and fixes the price at which the Administrator will buy camphor in that district. The number of stills licensed has been reduced to 1,400, while formerly 4,000 were said to be continuously employed. The crude camphor bought by the Government is now sent to a central factory at Taipeh, where it is pressed free from oil, compressed into cakes and prepared for export. This preliminary refining ensures the camphor being put on the market in a better condition than formerly. It is not intended at present to make any change in the native method of distillation, although this admits of great improvement, as will be seen from the following short description. A rough oven of loam, clay and stones is first built to a height of about four feet from the ground, in this is placed a quantity of wood, and on the latter a large iron kettle, to which water is continuously supplied from a second vessel provided with a tap. The kettle is surmounted by a cylindrical barrel packed full of small pieces of camphor wood. From the top of the barrel a bamboo tube leads to an air-tight box used as a receiver. The whole apparatus is carefully luted with clay, and when ready the wood is lighted, and, as a result, steam from the kettle passes up through the camphor wood carrying with it the volatile oil, which condenses in the long bamboo tube and runs into the receiver. Here the oil separates into a solid part, which is camphor, and a liquid portion, which constitutes crude camphor oil. The latter material still contains from 20 to 30 per cent. of camphor; formerly it was exported to Europe in this state, but now it is sent to Japan, where the valuable camphor is extracted, and the residual oil only sent to Europe. It should be noted, therefore, that the camphor oil now found in commerce is a much less valuable product than formerly. The distillation is chiefly carried on in the interior of the island, and is always liable to interruption from the semi-civilized natives, who also plunder the caravans on their way to the coast, the frequency of such depredations during last year accounting largely for the high price of the substance, which is at present just 100 per cent. greater than before the establishment of the new regime (*Schummel's Report*, October, 1900). In addition to restricting the production the Japanese Government also for a time prohibited the export of camphor, in the hope of forcing up the price with the object of obtaining a certain fixed revenue from the island. It is very doubtful whether this policy will succeed, since already celluloid, the manufacture of which formerly required a great deal of camphor, is now being made with naphthalene as a substitute. Camphor-oil also, which is chiefly used for perfuming common household soaps, will no doubt be replaced by other inexpensive oils if the price increases largely.

It is of interest to note in connection with the rise in the price of

camphor, that Messrs. Schimmel & Co. have suggested India and Ceylon as suitable countries for cultivating the camphor tree (*Berichte Von Schimmel*, April, 1896), and they point out that Mr. D. Hooper's investigations show that camphor may be successfully produced in India. This author found that the leaves of a camphor tree grown in the Indian Government plantation at Ootacamund yielded on distillation in a current of steam, an oil containing 10 to 15 per cent. of camphor, while a second specimen of leaves collected at Naduvatam, on the slopes of the Nilgiris, gave a richer oil, containing about 75 per cent. of camphor. This possibility has also been favourably regarded by Dr. Watt (*Dict. Econ. Prod. India*, page 89). That the establishment of plantations of camphor trees would be very profitable is clearly shown by the following statistics, which are those upon which the selling price in Formosa has been fixed by the Japanese Government.

The world's requirement of camphor is estimated at 10,400,000 lb. per annum; of this under the new administration, about 5,200,000 lb. will be supplied by Formosa, while about one-third of the whole will be exported from Japan, leaving a diminution on the export compared with 1898 of about 3,640,000 lb.

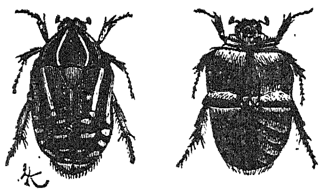
According to articles in the *Taiwain Nichi Nichi Shimpo*, published in Formosa, the actual cost of the production of camphor is 26·67 yen per picul (about £2 14s. for 133 lb.), the expenses of administration amount to about 28 yen per picul, and the selling price in Hong Kong is 70 yen per picul. The profit accruing to the Government is therefore about 30 shillings per picul at present, but it is hoped to increase the price so that on the total production of the island a profit of £135,000 will be made per annum.—*Imperial Institute Journal.*

Locusts and Other Insect Pests in the Transkei.

Attention having been drawn by Mr. C. C. Henkel, J.P., of The Pines, Umtata, to the damage caused to fruit crops in the neighbourhood by locusts and other insect pests, he was asked to furnish specimens, and as the matter is one of such general interest, the annexed notes upon the specimens received from him are published for general information.

Among the insects forwarded was a khaki-coloured beetle which Mr. Henkel reports as having destroyed a good many apples and peaches, roses, and the flowers of the grape myrtle. He states that the only way he has found effective for getting rid of them is by gathering them from the trees and bushes into tins and destroying them by pouring boiling water upon the mass. The insect in question has been identified by the Government Entomologist as

Protætia rufa. Mr. Lounsbury remarks that this beetle was seen last year at Fort Beaufort and Bedford, and has this year been sent in from George. It is chiefly obnoxious because of its fondness for ripening fruit. Generally it is found in company with allied Cetoniids, some larger, some smaller, and no two species alike in colour, but all working at fruit. We show a figure of *Rhabdotis semipunctata,* a somewhat smaller but closely allied species.



A specimen of a large green locust also forwarded, was identified as the common *Phymateus morbillosus,* which is widely distributed through the Colony, but one which can hardly be termed a pest. Another specimen, a smaller locust, also gaily coloured, is *Zonocerus elegans.* This locust is not wholly an enemy of the farmer, for it has the name of killing the pestiferous " harpuisbosch " and of feeding also on the rhenosterbosch. Both these locusts are said to be affected by the common locust fungus. Mr. Henkel further states that " the ordinary and red-winged locusts which devastated our fields last year about this time, have all perished as far as I can see. I found a number hanging on my peach trees and also on the lands, dead and dried np." This is most probably due to a natural outbreak of the Locust Fungus Disease.

He also mentions a moth—probably *Ophiuza lienardi*—as being common and destroying grapes, apples, peaches, plums, &c., and oranges have also been attacked by this insect at Wilo and other places. He states that he has successfully destroyed large numbers of this moth by hanging wide-mouthed bottles about the trees, with a little jam or sugar water in them. The moths went eagerly into these bottles and were destroyed by means of hot water afterwards. Many were also caught by means of fires by night.

Attention is also drawn to the destruction of useful birds by European and native boys whereby injurious insects increase to an alarming extent, and it is pointed out that the Butcher Bird is, *par excellence,* the bird that assists fruit-growers and should be strictly protected.—EDITOR.

CORRESPONDENCE.

Baboons.

Can you give me any information as to destroying baboons? My farm is infested with the brutes, and the locality is too bushy to hunt or even to shoot them with success.

GILBERT FOWLDS.

Thorneycroft, Sandflats, Feb. 29th.

The circumstances and situation of the farm and its surroundings not being favourable to the operation of a joint early hunt with neighbours, which has been found so successful in other cases, it is difficult to say what may be the next best plan. What may be done with traps, poison, and some other methods and remedies we shall be glad to learn from our readers who can give us their experiences of their efforts for the abatement of this very serious loss and plague of many of our farmers.—EDITOR.

Feeding Linseed.

Can one use pure linseed for feeding and fattening purposes with cattle instead of the cake, and if so which is the best way of doing so—(i) as it is or (ii) scalded, or (iii) ground and mixed with something else, and (iv) what would you advise that "something else" to be?

BLAKEBROOK.

Crushed linseed is occasionally used for feeding sick or prize cattle, but it is much less economical than cake. It must be crushed or some of the whole seed will pass through the animal undigested. Crushed linseed is mixed with two equal parts of bran, or with good chaff.

Large quantities of linseed are used for feeding calves. It is scalded and then mixed with skimmed milk to supply the place of the butter fat taken out by the separator. One pound of linseed contains about the same quantity of oil as a gallon of new milk does butter fat, about 5½ ounces. Scalded linseed could of course be used in mixing off with any kind of stock food suitable for the purpose.—EDITOR.

Show Fixtures.

Indwe Native Agricultural Society, March 1901.
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 50 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town, will be received up to the 31st March, 1901.

Surpus Seedlings.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 8th March 1901 :—

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Distribution of American Vine Cuttings—Season 1901.

The following Government Notice was published in the *Government Gazette* of the 12th February, 1901 :—

It is hereby notified for general information that the following are the arrangements made for the distribution of the American Vine Cuttings from the Government Plantations during the Season 1901.

1. All applications must be in writing upon printed forms obtainable from the Civil Commissioner and Field-cornets of the Division, and must be addressed to the local Board of Distribution for the District concerned.

2. Applications must be sent in to the Local Boards (addressed to the care of the Civil Commissioner) not later than the 18th of March, after which date no application can be received.

3. The Local Boards will thereupon allot the Cuttings according to the number estimated to be available, notifying the applicants in due course. Allottees must pay

for the Cuttings allotted to them not later than the 18th of May, after which date all Cuttings not paid for shall be considered as not wanted, and shall be forfeited and held to be available for allotment to some other person.

4. The Distribution of Cuttings will commence as soon as possible after the 1st of June. Allottees will receive their Cuttings direct from the Nurseries, and will be advised by post of the dispatch of the same.

5. The Cuttings will be divided into two classes, according to thickness. Cuttings not less than 3-16ths of an inch in thickness and 12 inches long will be charged for at the rate of 10s. per 1,000. Cuttings less than 3-16ths of an inch in diameter will be charged for at the rate of 5s. per 1,000; the apportionment to be left in the hands of the Distributing Officer. All Cuttings will where practicable be delivered in double length.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last :—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned :

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony :

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of...
Place to which Cattle are being sent.........................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..
Date....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of...
Place to which Cattle are being sent.........................
(Inspector's signature).....................................
(Address)..
Date....................

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 314.

The first of the series for the year 1901 began on January 15th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

Mark.	Description & Ship.	Bales.	s.	d.
CAPE.		Jan. 29.		
	Braemar.	Mossel.		
HVH (New Clip)	Grs.com sup. ...	28	0	7
	,, ,, ,, ...	28	0	6¾
	,, ,, ,, ...	26	0	6½
	,, ,, ...	38	0	6½
	,, ,, ...	18	0	6
	,, ,, ...	9	0	5¾
	,, lks. ...	9	0	3½
	,, ,, ...	8	0	3¼
LRD (New Clip)	,, com.sup...	36	0	7
	,, ,, ,, ..	21	not sold	
	,, ,, ...	8	0	6½
	Braemar, Kinfauns, Dunvegan, &c.	Mossel.		
HV&Co./MB (New Clip)	Grs.com.sup. ..	43	0	6½
	,, ,, ,, ...	18	0	6¼
	,, ,,	12	0	5¾
Paarl [S]	sn.-wt.ext.sup.	31	1	4½
	,, ...	1	1	1½
	Scd.	1	0	11
Waverley M's. T	sn.-wt.ext.sup.	6	1	5
	Scd. ...	1	1	0½
Paarl TW/M	..sn.-wt.ext.sup.	7	1	4
,, <I>	,, ,, ,,	1 or 2	1	3½
	,, sup.	1 or 2	1	1
Various ...	...	9	not sold	

Mark.	Description & Ship.	Bales.	s.	d.
	Saxon, Braemar, Gaika, Scot.			
RS	Grs.sup.com. ...	130	not sold	
	,, ,, ,, ..	39	0	4¾
	,, ,, ,, ...	30	not sold	
	,, ,, ,, .	1	0	3¾
	,, ,, ...	3	0	4
	,, ,, ,, dam.	2	0	4¾
KAF	Flc wsh. ...	31	0	7
R Toise	sup.sn -wt. ...	11	1	1½
	,, ,, ..	34	1	0½
	,, ,,	23 or 24	1	0
	,, ,,	11	0	10½
AR	Grs sup.com. ..	48	0	5¼
	,, ,, ,, ..	33	not sold	
	,, ,, ,,	30	0	5
	,, ,, ...	1	0	5¼
FSS	Scd.sup. ..	32	not sold	
	,, ,, ...	27	0	11
AJB	Grs.sup.com. ..	16	0	4½
	,, ,, ...	35	not sold	
	,, ,, ...	4	0	3½
ALGOA BAY.				
	Dunottar.			
HL&Co./7A	.. sn.-wt.ext.sup.	6	1	3½
[31]HL&Co.	.. ,, ,, ,,	11	1	3
[33] ,,	... ,, ,, ,,	12	1	3½

Mark.	Description & Ship.	Bales.	s.	d.
[28]HL&Co	...sn.-wt.ext.sup.	5	1	3
[29] ,,	... ,, ,, ,,	7	1	2½
[30] ,,	... ,, ,, ,,	4	1	3
14 in triangle PLW	,, ,, ,,	14	1	3
	,, sup. ...	1	1	0
22 in triangle ESM	,, ,, ext.	22	not sold	
	,, ,, ,,	44	1	1½
	,, ,,	5	1	0
15 in triangle ESA	sup.sn.-wt.ext.	8	1	2½
19 in triangle AJB	,, ,, ,,	19	1	0½
	,, ,,	2	not sold	
16 in triangle JCB	,, ,, ,,	11	1	1½
[32] HL&Co. &c.	Scd sup. ...	4	0	11
	,, crse. colored	4	not sold	

EAST LONDON.

Goorkha, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
ART	..Grs.sup.light ..	94	not sold	
XEL	,, ,, com.	17	0	5¾
	,, ,, ,,	55	not sold	
COM	... ,, ,,	71	not sold	

CAPE. Jan. 30.

Norman, Carisbrooke.

Mark.	Description & Ship.	Bales.	s.	d.
HvB	..Grs.sup.com. ...	34	0	5¾
AMC	Flc.wsh.sup. ..	34	0	6½
	Grs. ..	2	0	5

EAST LONDON.

Carisbrooke, Dunottar, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
(KN)	.. sn.-wt.sup. ..	54	not sold	
TYL	... ,, ,, ..	5	not sold	
KNS	... ,, ,, ..	15	1	1
KAF	Grs.sup.lam. ...	9	0	5¾
	,, ,, ..	15	not sold	
	,, ,, ...	17	0	5

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Horse's Head RPE	Grs.sup. ...	18	not sold	
	,, ,, ...	18	not sold	
Hazelmere	,, ,, ..	8	0	6
	,, ,, ...	5	0	5¾
	,, lam. ...	5	0	6
	,, lks. ..	5	0	4½
KR	,, sup. ...	10	0	6
	,, ,, ...	6	0	5¾
XX/N	... ,, x bd ..	4	0	5½

CAPE. Jan. 31.

Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl TW&Co.	Scd.grey ...	1	0	1½
	,, mix. ...	1	0	1

ALGOA BAY.

Briton, Kinfauns, Saxon, &c.

Mark.	Description & Ship.	Bales.	s.	d.
JL	...sn.-wt.ext.sup.	18	1	2½
JK	... ,, ,, ,,	14	1	1½
<K>	,, ,, ,,	6	1	0
<D>	.. ,, sup.	5	0	11½
JR	.. ,, ext.sup.	4	1	3
FB	... ,, ,, ,,	4	1	2½
JV	.. ,, ,, ,,	10	1	3½
AO	.. ,, ,, ,,	20	1	1½
GH	.. ,, ,, ,,	13	1	1½
FK	.. ,, ,, ,,	11	1	2
MS	. ,, ,, ,,	18	1	2
FH	.. ,, ,, ,,	17	1	2
DI	.. ,, ,, ,,	12	1	3½
PO	.. ,, ,, ,,	15	1	2½
Various	... ...	51	not sold	

EAST LONDON.

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Swords	sup.sn.-wt. ..	6	1	2
	,, ,, ..	86	1	1
Cala	..Grs.sup. ..	5	0	5¼
EL 6 Birds in rev. triangle	Flc.wsh.sup. ...	25	0	6¾
	,, ,, ,, ..	81	0	6½
A<J>K	Grs.sup. ..	14	0	4¾
	,, ,, ..	37	0	4½

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
LYT	..Grs.sup. ..	4	0	6½
WAR	,, ,, ..	16	not sold	
	,, ,, ..	14	0	6
	,, ,, ..	16	0	5½
BON	,, ,, ..	21	0	5¾
	,, ,, ...	7	0	6

Gaul, Scot, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
I<V>Y	Grs.sup. ..	14	0	5½
	,, ,, ..	14	0	6½
	,, ,, ..	15	0	5¾
MER	,, ,, ...	23	0	6
	,, ,, ...	15	0	5¾
	,, ,, dam...	1	0	5¾
	,, ,, ...	8	not sold	
	,, ,, ..	4	0	6
	,, ,, ..	7	0	5½
KSK	...sn.-wt.sup. ...	10	not sold	
KNS	... ,, ,, ..	43	not sold	
GCS	...Grs.sup. ..	6	0	5¼
D. Roam	.. ,, ,, ..	7	0	5½

Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs.sup. ..	9	0	6
	,, ,, ...	6	0	5¾
	,, ,, ..	8	0	5¼

Pembroke, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
FEN	Grs.sup.com. ..	36	0	5¼
	,, ,, ,, ...	5	0	4¾
BOM	... ,, ,, ,, ..	19	0	5¼
NOR	,, ,, ...	20	0	5½
	,, ,, ..	17	0	5
	,, ,, ..	5	0	4¾
CxB	... ,, + com. ..	4	0	5½
FJW	,, sup. ...	5	0	5
	,, ,, ...	10	0	4¾
	,, ,, ...	7	0	4½

Dunottar, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
FSS	...Scd.sup. ...	82not sold		

CAPE, Feb. 1.

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
<A>	Grs.com. ..	84	0	4¼
	,, ,, ..	29not sold		

CAPE. Feb. 5.

Pembroke.

Mark.	Description & Ship.	Bales.	s.	d.
FEN	Grs.sup.com. ..	21	0	5¼
	,, ,, ,, ...	21	0	5
BOM	.. ,, ,, ,, ...	22	0	5½
NOR	,, ,, ..	23	0	5
	,, ,, ..	19	0	4¾

EAST LONDON.

Braemar, Dunvegan, Norman, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Zulu	sn.-wt.sup. ..	32	1	1
	,, ,, ..	45	1	0½
	,, ,, ..	21	1	0
Toise	.. ,, ,, ..	10	1	0½
<B>	.. ,, ,, ..	8	1	0
B✱B	.. ,, ..	16	0	11½
ACMcD	Grs.sup.com. ..	23	0	5¾
	,, bel. ...	6	0	4

Gaika, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
FJW	Grs.sup. ..	16	0	4½
	,, ,, ...	10	0	4¼
EL Six Birds in rev. triangle	Flc.wsh.sup. ..	61not sold		
	Grs.sup. ..	3	0	5
,, ,, TM	...Flc.wsh.sup. ...	14not sold		

Carisbrooke, Saxon, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed Swords	sn.-wt.sup. ..	31not sold		
	,, ,, ...	82	1	0½
Three Stars	Grs.sup. ..	6	0	5½
	,, ,, ..	19	0	4¾
EJK/C	,, com. ..	6	0	5½
	,, lam. ..	2	0	5¾

Norham, Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
WAR	Grs.sup.lam. ..	10not sold		
	,, ,, ..	12	0	6¼
	,, ,, ..	44not sold		
	,, ,, dam.	5	0	5½
KAF	,, ,, ..	21not sold		
	,, ,, ..	11	0	5½
	,, ,, ..	25	0	5¼
BOR	.. ,, ,, com...	9not sold		
XSL	,, ,, ,, ..	20	0	6¾
	,, ,, ,, ..	43	0	6¼

CAPE.

Mexican, Pembroke.

Mark.	Description & Ship.	Bales.	s.	d.
AIA	Grs.sup.com. ..	29	0	5
	,, ,, ,, ...	28	0	4⅔
S M in reversed triangle W	sn.-wt.sup. ..	19	1	1½
	,, ...	8	1	0

EAST LONDON.

Dunottar, Carisbrooke, Briton, Gaul, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Kaffrarian M in reversed triangle	Grs.sup. ..	12	0	6
	,, ,, ..	14	0	5¾
	,, ,, ..	36not sold		
S	,, ,, ..	12not sold		
	,, ,, ..	17	0	6
	,, ,, ..	8	0	5¾
SS	... F W sup. ..	4	0	5
Anchor	.. ,, ,, ,, ..	68not sold		
KAF	..Grs.sup. ..	5	0	5½
I<V>Y	,, ,, ..	16	0	6¼
	,, ,, ..	38not sold		
IVY	... ,, ,, ..	11	0	5¾
(KN)	..sn.-wt.sup. ..	42not sold		
XSQ	.. ,, ext.sup.com.	49	,,	
CON	... ,, ,, ,, ,,	50	,,	
XEL	.. ,, ,, ,, light	10	,,	

CAPE. Feb. 6.

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
C HUM	Grs.sup.com. ..	14	0	5¼
	,, ,, ,, ..	8	0	5½
	,, ,, ,, ..	7	0	5
	,, ,, ,, ..	23	0	4¾

ALGOA BAY. Feb. 6.

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
[34] HL&Co.	..sup.sn.-wt.ext.	7	1	2½
[35] HL&Co.	.. ,, ,, ,,	5	1	2½
21 in triangle AP &c.	,, ,, ,,	7	1	2
24 in triangle LSB	,, ,, ..	126not sold		
LS	Grs.com.sup. ..	18	0	5
	,, ,, ..	19	0	4½
MB&Co.	.. ,, ,, ,, ..	12not sold		
Various	.. ..	13not sold		

EAST LONDON.

Briton, Tintagel, Carisbrooke.

Mark.	Description & Ship.	Bales.	s.	d.
E(B)L	..Grs.sup. ..	18not sold		
KRD	,, ,, ..	16 ,,		
	,, ,, ..	20 ,,		
	,, ,, ..	4	0	5¾
TTT	,, ,, ..	20not sold		
	,, ,, ..	8	0	5¾
	,, ,, ...	31not sold		
MER	,, ,, ..	37 ,,		
	,, ,, ..	8	0	5½

Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
SW/JT	..Grs.sup.com. ..	54not sold		

Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
MED/FW	Flc.wsh.sup. ..	33	0	7
	,, ,, ,, ..	21	0	6½

CAPE. Feb. 7.

Braemar, Dunottar, Carisbrooke, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl ROB	ext.sup.sn.-wt.	28	1	2½
	,, ,, ,,	6	1	4½
	,, ,, ,,	4	1	1
	,, ,, ,,	4	1	0
S ,,	..Scd.sup. ..	2	0	10
C ,,	.. ,, coarse ...	3	0	7¼
CC ,,	,, blk. ..	1	0	10½
	,, C C ..	2	0	8½

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms. ,,	..ext.sup.sn.-wt.	18	1	4½
CUR	Grs.com.sup. ..	12	0	4½
	,, ,, ..	2	0	5
	,, sup. ..	7	0	4¼
	,, com. ..	3	0	5¼
	,, ..	15	0	4
TAR	,, sup. ..	4	0	5½
	,, ,, ...	2	0	5¾
	,, ,, ...	3	0	5½
	,, ,, ..	11	0	4¾
	,, ,, ..	1	0	4½
DAR	...wsh. ..	13	0	5½

CAPE. Feb. 8.

Carisbrooke, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Toise	..sn.-wt.sup. ..	24	1	0½
(S)	..Scd.grey ..	3	0	4
XEL	Grs.sup.com. ..	45	0	5½
	,, ,, ,, ..	17	0	5¼
COM	,, ,, ..	53not sold		
	,, ,, ...	14	0	4¼

EAST LONDON.

Dunottar, Kinfauns, Saxon, Briton, &c.

Mark.	Description & Ship.	Bales.	s.	d.
IVY	Grs.sup.light ..	4	0	5¾
	,, ,, ,, ..	31not sold		
	,, ,, ,, ..	26	0	5½
	,, ,, ,, ...	11	0	5¼
	,, ,, ,, lam.	10	0	5¾
MER	Grs.sup. ..	10	0	6¼
	,, ,, ..	9	0	6
	,, ,, ..	4	0	5¾
	,, ,, ..	6not sold		
KRD	.. ,, ,, ..	9	0	6¼
LUM	... ,, ,, ..	7not sold		
TTT	,, ,, ..	11not sold		
	,, ,, ..	5	0	5¼
	,, ,, ...	6	0	5¾
	,, ,, ...	7	0	5½
	,, ,, ..	20	0	5¼
KSK	sn.-wt.sup. ...	11not sold		
	,, ,, ..	9	1	2
	,, ,, ...	38not sold		

CAPE. Feb. 9.

Auckland, Karamea.

Mark.	Description & Ship.	Bales.	s.	d.
<S>	..Scd. ..	6not sold		

Dunvegan, Pembroke.

Mark.	Description & Ship.	Bales.	s.	d.
AIA	..Grs.sup.com. ..	50	0	5¼
RAY	,, ,, ,, ...	18	0	6¼
	,, ,, ,, ..	2	0	4¼
	,, skt. ..	1	0	2¾

EAST LONDON.

Kinfauns, Mexican, Carisbrooke.

Mark.	Description & Ship.	Bales.	s.	d.
Horse's Head RPE	Grs.sup. ...	18	0	6
	,, ,, ...	18	0	$5\frac{3}{4}$
	,, ,, com. ..	4	0	6
	,, ,, ...	17	0	$6\frac{1}{4}$
	,, ,, ..	10	0	6
M F G	,, ,, ..	12	0	$5\frac{1}{2}$
	,, ,, ...	11	0	$5\frac{1}{4}$
	,, ,, ..	8	0	5
	,, ,, ..	10	0	6
	,, ,, ..	1	0	$4\frac{1}{2}$

CAPE.

Carisbrooke, Briton, Dunottar

Mark.	Description & Ship.	Bales.	s.	d.
MLN (New Clip)	Grs.sup.com. ..	14	0	$6\frac{3}{4}$
	,, ,, hgt. ..	6	0	$6\frac{3}{4}$
Various ..	..	4	not sold	

ALGOA BAY.

Norman, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
DRY	sn.-wt.sup. ..	3	1	2
	,, ,, ..	4	0	$10\frac{1}{2}$

EAST LONDON.

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed Swords	sn.-wt.sup. ..	18	not sold	
	,, ,, ...	15	1	1
	,, ,, ..	40	1	$0\frac{1}{2}$

7, Butler Street, Cripplegate,
London, E.C. Feb. 9, 1901.

The first series of Colonial Wool Sales for the current year commenced on the 15th ultimo and closed this day. The Brokers' priced catalogues were enfaced as follows:—

	Bales.
Sydney	80,047
Queensland	38,732
Victoria	42,090
Adelaide	15,087
Tasmania	2,009
West Australia	6,532
New Zealand	58,095
Cape & Natal	18,986
Total	261,578 Bales.

Purchases for export are estimated at about 100,000 bales, whilst "held-over and "bought-in" parcels are computed at somewhere about 95,000 bales, for realization in the ensuing series to commence here on the 12th March, 1901.

STABLES, STRAKER & Co.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday last, 9th March, 1901, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies, per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ...	0 9 6	0 18 0	0 12 6	0 11 0	0 12 6	0 7 6	0 12 0	0 9 6	0 16 0	0 1 0	0 0 10	0 0 10	0 1 6	0 2 6	£14 to £17	17/- to 30/-
Beaufort West ..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Burghersdorp ...	0 12 0	...	...	...	...	0 12 0	...	0 12 6	0 7 6	...	...	0 0 7	0 0 9	0 2 0	...	...
Cape Town ...	0 10 9	0 13 9	0 11 0	0 8 6	0 9 6	0 10 0	0 11 0	0 12 0	0 19 0	0 0 6½	0 0 7	0 0 7½	0 1 6	0 3 0	17 0 0	1 4 0
Clanwilliam ...	0 12 6	0 15 0	0 15 0	0 9 6	0 11 0	0 9 0	0 9 6	0 9 0	1 5 0	0 1 0	0 0 6	0 0 6	0 1 3	0 1 0	11 0 0	0 19 0
Colesberg ...	0 12 6	...	...	...	...	0 12 6	...	0 12 0	1 0 0	...	...	0 0 7	0 1 6	0 2 6	...	...
Cradock ...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	0 14 0	0 19 0	0 19 0	0 10 0	...	...	...	...	...	0 1 0	...	0 0 9	0 1 6	0 1 6	...	...
East London ...	0 11 6	0 18 0	0 17 6	0 12 6	0 9 9	0 15 9	0 18 0	0 12 6	0 17 0	0 1 6	0 1 0	0 1 1	0 1 6	0 3 3	25 0 0	1 6 0
Graaff-Reinet ...	0 12 6	0 18 0	0 14 0	0 12 6	...	0 11 0	0 18 0	0 12 6	0 10 0	0 1 0	0 0 8	0 0 7	0 1 3	0 2 0	£12 to £15	10/- to 22/6
Graham's Town ...	...	...	...	0 11 6	...	0 14 0	...	...	0 12 3	0 1 4½	0 0 8	0 0 8½	0 1 8½	0 2 3	...	...
Kimberley ...	0 13 0	0 17 6	0 14 0	0 13 0	0 13 0	0 12 0	0 16 0	0 14 0	1 10 0	0 1 6	0 0 10	0 0 9	0 2 9	0 3 6	£15 to £20	20/- to 23/-
King Wm's Town	0 17 6	0 16 0	1 10 0	0 13 6	1 3 6	0 17 6	1 0 0	0 12 6	0 16 0	0 0 10	0 1 0	0 0 10	0 1 7	0 2 8	£16 to £25	17/6 to 30/-
Malmesbury ...	0 10 6	0 15 0	0 12 0	0 8 6	...	0 8 6	0 10 0	0 9 6	0 14 0	0 1 6	0 0 7½	0 0 6½	0 1 6	0 2 0	16 0 0	1 2 6

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 17 0	0 12 6	0 9 0	..	0 6 0	0 10 0	0 7 6	0 12 0	0 1 3	0 0 9	0 0 9	0 1 9	0 1 6	...	
etermaritzburg, Natal	...	...	...	...	..	...	...	..	..	...	...	...	...	...	..	...
Port Alfred	...	...	...	0 10 6	...	...	...	...	0 10 0	...	...	..	0 1 6	0 1 9	...	...
Port Elizabeth ...	...	...	...	0 11 6	...	0 9 0	...	0 9 0	0 18 0	0 1 6	...	...	...	0 3 0	..	..
Queen's Town ...	0 12 9	0 17 9	0 14 6	0 13 9	0 12 3	0 16 0	0 15 9	0 11 6	0 19 6	0 2 6	0 0 9	0 0 8	0 1 0	0 2 6	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...
Vryburg ...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
Worcester ..	0 10	6 0	0 12 0	0 9 0	0 10 0	0 10 0	0 11 0	0 14 0	1 5 6	0 1 3	0 0 9	0 0 6	1 9	0 1 9	...	1 6 0

Returns have not been received from the Civil Commissioners of Beaufort West, Cradock, Tarkastad and Vryburg.

THE

Agricultural Journal.

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AGRICULTURE.

Reports and Prospects.

Knysna, *March 8th.*—Rainfall for the month 6.1 inches. The pasturage is luxuriant and the mealie crop promises to be good. Most of the cattle have been inoculated for redwater, and the operation has been generally successful. Probably the disease will cause less trouble in future. There is no other contagious disease amongst stock. Some goats have died owing to luxuriance of pasturage. Influenza amongst horses has been severe. Stock, generally, look well and in good condition. M. JACKSON, C.C.

Kokstad, *March 1st*.—A fair amount of rain fell during the past month, crops are doing well and grass is plentiful. The season has not been a good one as regards fruit, probably on account of the lateness of the rains. Stock of all kinds are doing well and fetching high prices, and some hundreds of horses have been sent away to the front. The rainfall during February was 3.41 inches, which, although sufficient for present requirements, is, with what has previously fallen, very little to enable the country to last during the coming dry season. W. LEARY, R.M.

Maclear, *March 13th*.—During the month some very beneficial rains fell and the veld in all parts of the district is looking grand. No diseases amongst stock have been reported. The mealie crop is promising, and provided no early frosts fall there is no prospect of starvation amongst Natives. L. PINKERTON, A.R.M.,

Matatiele, *Feb. 6th*.—I have nothing to add to my report for the month of January except that very fair rains have fallen during the past month, which have much improved the veld and brought on the crops of mealies and Kaffir corn. Stock are in excellent condition, and prospects for the coming winter have certainly much improved. Three cases of lung-sickness have been reported, and the usual stringent measures have been taken to prevent the disease from spreading. W. BELLAIRS, R.M.

Mount Ayliff, *March 4th*.—During the past month some rains have fallen, though more are greatly needed. Growing crops are doing fairly well and the pasturage is good. No locusts have appeared lately. There is no contagious disease among any animals in this district. R. HARRIES, R.M.

Mount Fletcher, *March 2nd*.—Excellent rains have fallen during the month. Crops coming on well, and in some parts of the district green mealies are being eaten. Veld splendid. Cattle, horses, sheep, &c., are fat, and there is no disease.
H. TILLARD, A.R.M.

Mount Frere, *March 4th*.—Refreshing rains fell during last month, and both crops and veld show a general improvement. There are no locusts in the district, and a good harvest is anticipated. All stock are in good condition. No fresh cases of lung-sickness have been reported, and every effort is being made to stamp out the disease. H. GARNER, A.R.M.

Qumbu, *Feb. 28th*.—Seasonable rains continue throughout the month now closing and the crops are in consequence coming on well. Another severe hailstorm passed over a tract of the district with disastrous results, the crops in some localities being levelled to

the ground. Pasturage is good and plentiful. Lung-sickness has not spread beyond the quarantine area mentioned in my reports for the last two months. There are still a few cases of sickness.

A. REIN, R.M.

Tsolo, *March 4th*.—A very good rain has fallen since my last report, which came just in time to save many of the crops and which are now looking well, and there is every prospect of a fair harvest being gathered. Horses have died from biliary fever, but other stock are healthy. J. SIMPSON, R.M.

Umzimkulu, *Feb. 28th*.—Growing crops look most promising generally, but in the southern portion of the district drought has caused considerable losses. Only one good day's rain fell during the month. Very few cases of horse-sickness have appeared this season. Cattle are in good condition and free from disease, so are small stock. There is nothing further of importance to report.

E. WHINDUS, R.M.

The Chemical Composition of the Soils of the South-Western Districts of the Cape Colony.

BY CHAS. F. JURITZ, M.A.

(*Continued from page* 338.)

For obvious reasons it will not be advisable to take the soils collected and analysed by us in their chronological order. Eighteen samples were collected from the granite formation which extends between St. Helena Bay and Koeberg. It was, however, thought that, as the granitic soils of the Cape Peninsula had already been to some extent explored, it would be advisable to go further afield and enter upon a formation regarding whose soils very little, if anything, had up till then been learnt—from a chemical standpoint, of course. Hence, even while collecting soils from this granitic area, our aim was to confine ourselves as much as possible to the alluvial soils derived from the clay slate lying to the east of the granite. It may, however, be well to give a complete list of the soils collected from the granite formation. Together with the results of the analytical examination they will be found comprised in the following table:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—MALMESBURY.							
Field-Cornetcy: Groenekloof East							
22 Alexanderfontein ..	·485	3·117	·0010	·129	·081	·035	·045
23 Rheboksfontein	·797	4·155	·0032	·117	·095	·098	·048
24 Platteklip	·561	2·235	·0012	·035	·046	·102	·050
Field-Cornetcy: Zwartwater							
25 Drooge Vlei .. .	7·254	9·262	·0058	·140	1·99	·492	·063
26 ,, ...	·932	2·136	·0057	·028	·156	·122	·028
27 Zwart Water	·776	1·810	·0025	·035	·125	·075	·033
28 ,, ...	·476	2·036	·0017	·028	·108	·054	·039
Field-Cornetcy: Schryvers							
29 Geelbeksfontein	1·852	16·259	·226	·325	1·159	·443	·180
30 Oostenwal	·778	3·293	·0013	·042	·364	·124	·052
Field-Cornetcy: St. Helena Bay							
31 Patrijzen Berg	·468	1·121	·0009	·049	·062	·046	·027
32 Schuitjes Klip	1·008	2·533	·0093	·035	·015	·021	·050
33 Uitkomst	2·324	3·477	·0017	·091	·418	·105	·094
34 Noodhulp	1·855	2·553	·0011	·077	·165	·062	·046
35 Holle Vallei	1·278	4 823	·0024	·084	·043	·039	·027
36 Klip Rug	1·940	4·303	·0016	·112	·139	·060	·045
DIVISION—BREDASDORP							
Field-Cornetcy: Bloemfontein							
37 Avoca	·38	2·36	·015	·17	·32	·071	·013
DIVISION—MOSSEL BAY							
Field-Cornetcy: Before Attaquas Kloof							
38 Hartebeeste Kraal ..	3·52	5·68	·032	·056	·15	·63	·074
39 ,, ,, ..	·92	2·47	·0071	·031	·13	·18	·061

Scarcely any in the foregoing table can be classed as true granitic soils, either primary or alluvial. Nos. 22, 23 and 24 are alluvial clays, the last of the three being apparently, judging from its appearance, affected by the granite below; this also shows itself in the smaller amount of lime and higher percentage of potash. Nos. 25, 26, 27 and 28 are all clay soils, the last three being of a rather sandy nature: it is somewhat interesting to note that No. 25, a stiff, grey-coloured soil, is locally described as "rust resistent," whereas this is not the case with sample No. 28, a sandy soil. When one reflects on the circumstances that the former of these two soils is well supplied with the essential fertilising ingredients of soils, and that No. 28 is the poorest of the four soils, one reason for the local opinion on the subject becomes evident. The crops grown under the advantages of the fertile soil are better able to remain proof against attack than

those grown on soil such as that represented by No. 28, which just misses being a poor all-round soil. In the case of sample No. 25 the effect on the composition of the soil of the compacted blown sand underlying the immediate surface soil throughout extensive portions of the Malmesbury Division is clearly noticeable. No. 29 is a humus soil of considerable fertility—so productive, in fact, that fallowing is rendered unnecessary. The underlying limestone here, too, greatly aids the fertility of the soil. No. 30 is the first granitic soil on this list, but it is not a pure granite, being intermixed with the lime deposit; and here, as in some other cases, manuring is never practised. It is well known amongst many farmers in this neighbourhood that the limestone soils to a large extent withstand rust, and that at times, when the grain grown on sandy soil is almost completely ravaged, the crops standing on the lime soils are only slightly affected. Nos. 31 and 32 are rather sandy, but 33 is an alluvial clay soil; 34, 35 and 36 are sandy loams.

The foregoing samples are of too miscellaneous a nature to enable one to draw definite general conclusions, but it is noteworthy that the soils more or less affected by the underlying limestone, such as Nos. 25, 26, 29, 30, 33, are also proportionately richer not only in lime—as is but natural—but also in potash, than the other samples. The ultimate origin of the large amount of potash in soils of this nature is a point of some interest worth elucidating; it does not seem improbable that it is caused by the *débris* of granitic rocks being mixed with the compacted sand: from the blown sand the potash could certainly not be derived; least of all is such an idea plausible when we consider that the quantity of potash available in some of these soils ranges as high as ·5 per cent. No. 29 is the only soil that can be called rich in phosphates; Nos. 24, 25, 30, 32 and 33 have a fair amount, but all the rest are decidedly poor in this respect.

The sample No. 37, taken from above a small outcrop of granite in the Bredasdorp Division, is an alluvial sandy soil derived from the surrounding hills, which are composed of Table Mountain sandstone; the amount of lime in this soil is satisfactory, and it has a fair quantity of potash, but is poor in phosphates.

From the mass of granite which, commencing north-west of Mossel Bay, extends over a considerable portion of the George Division, two samples were taken on the farm Hartebeest Kraal; they are numbered 38 and 39, the former a red and the latter a black soil. Both these samples contained a fair amount of lime, but No. 38 was very rich in potash, and indeed No. 39 was not unsatisfactory in this respect; the phosphoric oxide is moderate in amount in both cases. The preponderance of potash appears to be due to the felspar of the granite, but the question is still being investigated, inasmuch as a number of samples, taken further eastward, are at the present time under analysis.

Turning now to the Malmesbury clay slate beds, 75 samples were collected and analysed; these were distributed as follows:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—CAPE							
Field-Cornetcy: Tygerberg and Kuils River							
40 Maastricht	1·33	15·50	·054	·128	·48	·045	·028
41 ,, ...	2·97	10·52	·057	·201	·64	·27	·028
42 Eversdal	1·37	6·94	·0053	·134	·39	·12	·044
43 ,, ...	1·75	7·64	·0028	·134	·35	·026	·062
Field-Cornetcy: Durban							
44 Diemersdal	1·03	4·60	·021	·106	·23	·14	·028
45 ,, ...	1·22	6·67	·0074	·134	·25	·27	·019
46 Phesante Kraal	1·38	5·31	·0021	·089	·23	·043	·044
47 ,, ,, ...	·63	2·84	·0024	·123	·12	·025	·032
48 ,, ,, ...	1·12	5·79	·0060	·084	·32	·023	·017
Field-Cornetcy: Palen and Rietvlei							
49 Visser's Hok	1·61	4·16	·0024	..	·24	·43	·035
50 Government Land North of Visser's Hok	·27	·51	·0005	·056	·046	·039	·0038
Field-Cornetcy: Koeberg No. 1							
51 Vrymansfontein ..	·70	2·85	·0095	·056	·22	·35	·020
52 ,, ...	·44	2·11	·0053	·061	·11	·12	·020
53 Rondeboschjesberg ..	·94	4·00	·0021	·044	·15	·16	·026
54 Ongegund	1·19	3·92	·0064	..	·23	·24	·026
55 Altona	1·40	4·35	·0006	..	·13	·071	·062
56 Adderley	1·60	2·05	·0026	·061	·061	·070	·019
Field-Cornetcy: Koeberg No. 2							
57 Klein Olifant's Kop ..	·81	1·73	·0004	·061	·095	·038	·023
58 Kalkfontein	·62	1·64	·0018	..	·061	·036	·017
59 Uitkyk	·96	2·36	·021	..	·067	·065	·013
60 ,, ...	1·65	4·20	·0016	..	·16	·093	·076
61 ,, ...	2·04	2·67	·0028	..	·16	·098	·040
62 Dassen Vallei	·96	2·59	·0013	..	·070	·094	·026
63 Klein Dassen Berg ..	·236	·808	·0015	·035	·061	·021	·029
Field-Cornetcy: Blaauwberg							
64 Lange Rug	·836	2·167	·037	·028	·057	·030	·017
DIVISION—MALMESBURY							
Field-Cornetcy: Mosselbanks River							
65 Kalabas Kraal Station ..	·295	·816	·0006	·014	·059	·041	·016
Field-Cornetcy: Middle Zwartland							
66 Twee Kuilen	·49	1 90	·0003	·061	.056	·107	·051
67 ,, ...	·68	2·47	·0003	·078	·092	·171	·071
68 Vaderlandsche Riet Kuil ..	1·16	5·24	·0008	·095	·136	·128	·064
69 Bloemendals Fontein ..	·142	1·069	·0004	·050	·059	·038	·025
70 Rheboksfontein	·906	2·911	·0014	·091	·049	·031	·030
71 Michiel Heyns Kraal ..	·668	2·296	·0011	·070	·108	·039	·038
72 ,, ,, ,, ..	7·160	15 358	·0056	·252	·369	·033	·080

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
Field-Cornetcy: Groenekloof East							
73 Klipfontein	·172	·954	·0008	·067	·039	·042	·032
74 Karnemelksfontein ..	1·033	4·439	·0014	·089	·147	·059	·041
75 ,, ..	·294	2·157	·0006	·072	·062	·064	·022
Field-Cornetcy: Honing Berg							
76 Holle Rivier	·936	2·495	·0009	·063	·064	·074	·032
Field-Cornetcy: Zwartland							
77 Witkei	·98	3·60	·0022	·117	·160	·130	·056
78 ,, ...	·80	1·86	·0347	·072	·050	·077	·044
79 ,, ...	1·05	2·79	·0010	·095	·108	·101	·051
80 Olifants Kuil	·62	2·68	·0004	·056	·104	·062	·038
81 Geel Kuil	1·23	4·02	·0007	·033	·036	·119	·035
82 New Rush	·60	2·99	·0012	·078	·028	·144	·071
83 ,, ...	·58	2·61	·0010	·084	·082	·090	·064
84 ,, ...	·59	2·53	·0031	·061	·098	·092	·051
85 Schildpad Vallei ..	·46	2·04	·0002	·067	·060	·020	·074
86 Hooi Kraal	·68	2·94	·0009	·084	·032	·033	·053
87 Zwartfontein	·35	1.72	·0005	·072	·064	·042	·040
88 Vogelstruisfontein ..	·73	5·17	·0002	·100	·076	·090	·076
89 Klein Zoutfontein ..	·37	1·63	·0003	·056	.052	·042	·066
90 ,, ,, ..	1·68	3·17	·0005	·156	·068	·090	·063
91 Zoutfontein	·31	1·76	·0002	·077	·036	·045	·086
Field-Cornetcy: Zout River							
92 Haazenkraal	·243	1·060	·0050	·042	·024	·045	·124
93 Portugueeschfontein ..	·169	·586	·0005	·021	053	·018	·134
94 Bosjesmans Kloof ..	·870	1·831	·0103	·091	·187	·066	·042
95 ,, ,, ..	1·084	7·898	·0042	·133	·010	·052	·058
96 Breek Muur	·703	1·548	·0020	·077	·046	·048	·042
97 Leliefontein	1·942	4·091	·0108	·126	·256	·075	·027
98 ,, ...	·394	1.204	·0009	·035	·039	·026	·038
Field-Cornetcy: Saldanha Bay							
99 Springfontein	·520	2·439	.0016	·035	4·715	·058	·025
100 Spanjaardsbosch ..	·415	·939	·0015	·049	·231	·037	·075
101 Cloeteskraal	1·165	2·594	·0006	·049	.220	·068	·055
102 Lang Riet Vlei ..	1·980	2·972	·0147	·070	1·826	·182	·053
103 ,, ,, ..	·577	1·312	·0022	·047	·073	·063	·027
104 ,, ,, ..	·203	·540	·0006	·028	·063	·046	·025
105 ,, ,, ..	·509	1·012	·0008	·028	·114	·061	·034
Field-Cornetcy: St. Helena Bay							
106 Muishondfontein ..	·413	·675	·0006	·084	·084	·042	·048
107 Eenzaamheid	·348	·666	·0010	·056	·034	·035	·027
DIVISION—BREDASDORP							
Field-Cornetcy: Bloemfontein							
108 Vogelstruis Kraal ..	·67	3·27	·0099	·15	·11	·063	·0092
109 Ronde Rivier	1·80	8·08	·045	·16	·26	·045	.016
110 Koude Rivier	·74	3·45	·012	·13	·12	·036	·0082
111 ,, ,, ...	·71	4·06	·0092	·12	·14	·016	·022

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
Field-Cornetcy: Zoetendals Vallei							
112 Miere Kraal	·95	5·14	·014	·15	·28	·13	·026
113 Elands Drift	1·18	3·58	·0085	·15	·11	·10	·013
DIVISION—ROBERTSON							
Field-Cornetcy: Robertson							
114 Keur Kloof	1·11	4·51	·014	·11	·72	.14	·011

On comparing the map showing the various localities whence the foregoing samples were collected with the diagram (Plate XVII.), which illustrates the chemical composition of each sample, a few broad features strike one. The first is this, that the amount of available lime averages ·5 per cent. in the soils about Durban, thins out to about ·1 per cent., and even less, in the northern part of the Koeberg district, and remains fairly uniform as we go north to near Hopefield, the average percentage of lime in the 35 soils collected on the clay slate formation in the Field-Cornetcies Koeberg No. 2, Blaauwberg, Mosselbank River, Middle Zwartland, Groenekloof East, Honing Berg and Zwartland being only ·078 per cent.; in other words, the average soil in the area just mentioned is decidedly poor in lime.

The following will show this more clearly: The four soils collected within the Field-Cornetcy of Tygerberg and Kuils River, Nos. 40 to 43, yielded an average percentage of ·47 of available lime. The next strip of country, lying to the north of this, and mainly within the Durban Field-Cornetcy, represented by the seven samples 44 to 49 and 54, gave an average of ·23 per cent. Next come Nos. 50 to 53 north of Durban, and constituting the southern portion of the Koeberg district; these give an average of ·13 per cent. of lime. The middle part of the same district, comprising Nos. 55 to 62—8 samples in all—yields an average of ·10 per cent. In the Northern portion of Koeberg and the southern part of Zwartland we have the samples 63, 64 and 65, giving an average percentage of ·059. As we go further north we pass over samples 71 and 72, which are humus soils and probably also affected by the granite boss to eastward as well as the extent of granite lying to the west. Nos. 69, 70 and 73 represent the next area, and the average in this case is ·049 per cent. Afer this it becomes difficult to trace the gradation owing to the influence of the underlying limestone. A diagram (see Plate XVIII.) enables us to grasp the continuous diminution of lime at a glance.

About Hopefield and to the north-west of it there is again an increase of lime in the soil, clearly traceable to the compacted sand dunes previously referred to. In some cases—samples 99 and 102, for instance—the amount of lime is very large proportionately to the other constituents of the soil, for here, on the clay slate, the simul-

taneous increase of potash is not so noticeable as, for instance, in soils 25 and 29, where the underlying rock is granite.

Diverse from the changes in the lime content of the soil, strangely enough, is a marked increase in the phosphoric oxide as one travels northwards from Durban. Taking the clay slate soils of the Cape and Malmesbury Divisions as a whole one may conveniently divide them into three sections as regards the amount of phosphates the soil contains. First of all may be taken the area south of the farm "Uitkyk" in the Koeberg district, then the stretch of country between "Uitkyk" and the Great Berg River, expressly excluding the Zwartland soils, and finally the area covered by the Zwartland Field-Cornetcy. The first of these three areas comprises samples 40 to 58—19 in all; they average ·029 per cent. of phosphoric oxide. The samples taken from the next area are 34 in number, comprised in two sets, namely Nos. 59 to 76 and 92 to 107. In these the average percentage of phosphoric oxide is respectively ·041 and ·046: the former represents the country north, and the latter that south of Zwartland. The Zwartland area comprises the 15 samples 77 to 91, and they yield an average of ·058.

There is a diminution of potash, somewhat similar to that already noticed in the case of the lime, as we proceed from south to north within the area under consideration, but in this case it is not as striking nor as regular. Several of the southernmost soils contain a respectable proportion of potash—for instance, Nos. 41, 45, 49, 51 and 54, the percentage of potash in which averages ·32: these soils may all be said to be rich in potash. In the Zwartland area there is a noticeable difference in respect of potash between the western soils and eastern soils; the former, comprising Nos. 77 to 84, contain on an average ·102 per cent., the minimum being ·077, whereas the samples taken from the more easterly part of the Field-Cornetcy, Nos. 85 to 91, yield an average of only ·060 including a minimum of ·020.

Summarising our results with respect to the clay soils of the Cape and Malmesbury districts we may say that no less than 16 out of the 68 soils examined were poor in all three of the essential inorganic elements of plant food; there is one such poverty-stricken patch about the middle of the Koeberg district, represented by samples 50, 57 and 58, and two others of apparently wider extent in the northern portion of the same district and in the south of Zwartland; the former of these two is represented by samples 63, 64 and 65, and the latter by Nos. 69, 70 and 73. As many as 45 of the soils are poor in phosphoric oxide; five of these are poor in phosphoric oxide and potash (and this is notably the case with the farm Phesante Kraal, near Durban), while eight are poor in phosphoric oxide and lime, and as already observed, 16 are poor all round, leaving a balance of 16 samples which show poverty in phosphoric oxide only. Eight samples were poor in lime only, three poor in potash only, and five poor in both lime and potash. There are, therefore, only seven samples that do not show a deficiency in respect of one or other of the three fertilising constituents, and even

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out of these seven, six are no better than fair all round, while the seventh—No. 102— is rich in lime, contains a normal amount of potash and a fair quantity of phosphoric oxide.

The six Bredasdorp soils examined were all, without exception, poor in phosphoric oxide; two of them—Nos. 108 and 110—particularly; all of these soils, however, yielded at least a fair amount of lime, but in three—Nos. 109, 110 and 111—the potash was likewise deficient. The average composition of these six soils is—lime ·17, potash ·065, phosphoric oxide ·016. The sample from the Robertson Division showed a good percentage of lime and a fair amount of potash, but phosphoric oxide was deficient.

We now come to the soils of the Bokkeveld beds, numbering 76. The following table shows the analytical results :—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—CALEDON.							
Field-Cornetcy: Upper River Zonder End							
115 Middelplants	·73	2·67	·55	·084	·270	·13	·033
Field-Cornetcy: Zwart River							
116 Zwart River	1·24	6·69	·0086	·15	·034	·13	·059
117 ,, ...	·51	2·15	·093	·091	·018	·043	·038
Field-Cornetcy: Bot and Palmiet Rivers							
118 Rietfontein	1·60	6·57	·0038	·17	·093	·050	·058
119 The Vlei	1·44	6·33	·0040	·15	·028	·056	·036
120 Lang Hoogte	2·04	11·71	·0038	·25	·083	·073	·032
121 ,, ,, ...	1·42	6·60	·0056	·15	·030	·038	·058
122 Avontuur	1·48	7·57	·017	·15	·026	·098	·049
Field-Cornetcy: Caledon							
123 Muurton	·87	4·36	·0042	·11	·039	·036	·056
124 ,, ...	1·37	5·25	·018	·10	·018	·055	·038
125 Klein Steenboks River ..	1·27	4·94	·0042	·15	·150	·076	·056
126 Weltevreden	1·57	6·14	·0050	·15	·024	·073	·056
127 Dunghye Park	1·67	7·42	·0055	·20	·045	·087	·059
Field-Cornet : Uilenkraal							
128 Good Hope	1·28	5·21	·0070	·15	·010	·044	·051
129 Weltevrede n	·84	3·22	·0027	·11	·038	·024	·056
Field-Cornetcy: Goudini							
130 Goudini	1·58	7·88	·0058	·20	·016	·072	·036
Field-Cornetcy: Lower River Zonder End							
131 Roode Vlei	1·93	7·98	0034	·17	·058	·068	·13
132 Jongens Klip	1·93	7·04	·0064	·18	·032	·071	·051
133 Alexanders Kloof ..	1·87	7·19	·0034	·20	·045	·078	·061
134 Ganze Kraal	2·10	8·20	·014	·22	·058	·049	·061
135 ,, ...	1·37	4·30	·0049	·098	·030	·061	·041
136 Tygerhoek	·95	4·60	·0042	·13	026	·042	·038
137 The Oaks	1·10	6·04	·0037	·16	·041	·045	·056

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—BREDASDORP							
Field-Cornetcy: Napier							
138 Klippe Drift	1·25	7·95	·0096	·18	·20	·062	·011
139 Leeuwen Drift	1·63	9·65	·019	·18	·15	·18	·026
140 Halfaampjeskraal ..	1·39	6·94	·119	·15	·18	·19	·032
141 Quarrie	1·27	7·01	·022	·17	·16	·11	·026
142 Klippe Drift	0·95	5·86	·001	·16	·37	·13	·028
143 ,, ...	0·91	4·23	·028	·17	·094	·089	·019
Field-Cornetcy: The Ruggens							
144 Rem Hoogte	1·32	6·91	·017	·15	·15	·19	·038
145 Koeranna	1·43	7·19	·043	·077	·15	·15	·030
146 Haasjes Drift	1·65	6·34	·0071	·15	·16	·12	·024
147 Nooitgedacht	0·71	3·96	·0064	·19	·094	·15	·022
148 Patrys Kraal	1·02	2·89	·017	·16	·20	·098	·010
DIVISION—SWELLENDAM							
Field-Cornetcy: River Zonder End							
149 Appels Kraal	0·09	0·77	.0056	·11	·084	·034	·0048
150 ,, ...	1·05	5·41	·025	·18	·060	·035	·011
151 ,, ...	0·57	3·36	·013	·16	·044	·049	·015
152 ,, ...	0·75	3·85	·0085	·14	·058	·10	·014
153 Stormsvlei	0 68	3·59	·093	·15	·14	·078	·016
154 Verdwaalkloof	0·95	6·90	·018	·16	·25	·084	·013
155 Klipfontein	1·44	7·20	·028	·14	·16	·13	·012
Field-Cornetcy: Kluitjes Kraal							
156 Vryheid	·051	3·73	·011	·16	·080	·055	·017
157 Kluitjes Kraal	·080	4·78	·086	·15	·084	·14	·022
Field-Cornetcy: Swellendam.							
158 Appelbosch	1·50	4·64	·0028	·028	·096	015	·036
159 Oude Post	1·58	5·91	·0025	·065	·15	·053	·041
160 Kinko	1·08	4·14	·019	·098	·33	·062	·023
Field-Cornetcy: Breede River.							
161 Uitvlugt	1·76	5·65	·010	·098	1·18	·43	·009
162 Rhenosterfontein ..	·59	1·87	·0073	·056	·16	·099	·010
Field-Cornetcy: Heidelberg.							
163 Klein Duine Rug ..	·84	2 98	·011	·042	·32	·018	·014
164 Wagen Drift	·91	4·25	·019	·056	·37	·087	·019
165 Asch Kraal	2·68	7·53	·086	·035	2 73	·29	·041
Field-Cornetcy: Karnemelk River.							
166 Honig Klip	1·70	9·26	·015	·12	·40	·045	·008
167 Karnemelk River ...	4·82	4·07	·048	·077	·37	·11	·031
Field-Cornetcy: Zuurbraak.							
168 Melkhout Boom... .	2·86	9·07	·016	·084	·23	·060	·019
169 ,, ,, ...	2·07	4·67	·015	·084	·083	·099	·036

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—ROBERTSON.							
Field-Cornetcy : Middel Bosjesveld.							
170 Vrolykheid	·34	1·94	·023	·077	1·08	·070	·060
171 Riet Vallei	1·35	5·01	·014	·14	·13	·10	·021
172 Bosjesmans River ...	2·09	6·30	·0088	·16	·79	·32	·051
173 „ „ ..	1·48	4·96	·035	·056	·29	·22	·068
DIVISION—RIVERSDALE.							
Field-Cornetcy : Onder Duivenhoeks River.							
174 Oude Muragie	2·10	5·20	.014	·028	·013	·36	·090
175 Jan Pienaars Rivier ...	1·79	4·85	·017	·056	·11	·21	·58
Field-Cornetcy : Vette River.							
176 Brak Rivier	1·73	4·20	·010	·15	·12	·13	·058
177 „ „	1·14	4·81	·012	·056	·12	·32	·081
178 Oude Bosch	1·66	3·78	·010	·056	·19	·14	·087
Field-Cornetcy : Riversdale.							
179 Novo	2·05	4·01	·012	·15	·18	·24	·099
180 Klein Rivier	3·63	5·71	·013	·028	·13	·24	·15
Field-Cornetcy : Valsch Rivier.							
181 Boschjesfontein	2·69	4·50	·062	·070	·14	·19	·069
182 Middelste Drift	4·05	4·87	.012	·11	·13	·34	·056
Field-Cornetcy : Buffels Kraal.							
183 Zandfontein	2·58	2·85	·0062	·028	·11	·15	·044
184 Drooge Rug	0·96	2·13	·0053	·028	·14	·26	·069
Field-Cornetcy : Kaffir Kuils River.							
185 Hooge Kraal	2·38	4·68	·011	·029	·10	·29	·089
186 Tartouwa	1·61	4·32	·025	·027	·13	·24	·044
DIVISION—MOSSEL BAY.							
Field-Cornetcy : South Middelveld.							
187 Buffels Drift	2·52	6·29	·0062	·056	·43	·39	·13
188 Hartjesfontein	2·99	4·87	·037	·043	·23	·46	·070
189 „	6·95	10·24	·035	·17	·59	·87	·12
Field-Cornetcy : Mossel Bay.							
190 Patrysfontein	·78	2·29	·026	·13	·10	·13	·033

Here again, as in the case of the clay slate soils, we may fairly compare the map with the diagram (Plate XIX.) showing the chemical composition of the individual samples, and again some salient features are noticeable at the first glance. The Caledon soils, for instance, are far the lowest in respect of the quantity of lime contained, the average percentage of lime in the 23 soils being only ·054, with a minimum of ·016 and a maximum of ·27 ; in fact only

two samples, Nos. 115 and 125, attain to more than ·1 per cent. This is a very much worse exhibition than anything afforded by the Malmesbury slates. Passing eastward into the Bredasdorp Division, a considerable improvement manifests itself. The lime rises to an average percentage of ·174 in the 11 soils of this Division, an average percentage about five times as great as that in the Caledon soils. This percentage is maintained in the western part of the Swellendam Division represented by the Field-Cornetcies of River Zonder End, Kluitjes Kraal and Swellendam, the average of 12 soils collected in this area being ·128. The diminution is due to the low lime contents of the four soils, Nos. 149, 150, 151 and 152, from the farm Appelskraal. Now these samples, it must be remarked, lie just on the verge of the mass of sandstone which forms the River Zonder End range, and are apparently influenced thereby. To this influence must also be ascribed the poverty in lime exhibited by the Caledon soils, lying, as they do, in a tract of country almost entirely hemmed in by sandstone. When we reach the Bredasdorp Division and the western part of the Swellendam District we emerge from this sphere of influence, and the lime becomes less deficient. I have included sample No. 160 from the farm Kinko in the western half of the Swellendam Division; but manifestly that is not its proper place, for it lies east of the Breede River and of the Witteberg beds which surround the village of Swellendam, and hence belongs to an area which, as we shall see, differs somewhat from the western part of the division. Compare in the diagram showing the composition of the various soils, this sample No. 160, with the others belonging to the western prrt of the district, namely, Nos. 153 to 159, and the dfference becomes immediately apparent. The lime shows a definite preponderance over that of the other samples. It is the beginning of an increase which becomes much more noticeable as we go still further eastwards. This is clearly seen on the diagram in the case of all the samples from 161 up to 167 both inclusive. Nos. 168 and 169, which of course belong to this part of the division, are again poorer, but they are also within reach of the sandstone formation just to the north.

The potash, it will be noticed from the diagram, increases with the lime, through the ratio of increase is smaller. Strange to say, however, the amount of phosphoric oxide is apparently in inverse proportion to the amount of lime. The reason of this curious fact I have not been able to solve. These remarks apply only to the soils of the Caledon, Bredasdorp and Swellendam Divisions. On coming to Riversdale we find, conjointly with an increase of phosphoric oxide, a fairly large increase of potash, while the lime is about the same as in the western portion of the Swellendam District. Still further east, in the division of Mossel Bay, three out of the four soils analysed showed an all-round improvement on the soils of the more westerly districts.

(To be continued.)

Twelfth Biennial Report Kansas State Board of Agriculture, 1899-1900.

We are in receipt through the courtesy of Mr. F. D. Cobourn, Secretary of the State Board of Agriculture, Topeka, Kansas, of the above report.

The first 670 pages of this handsomely made volume, with 180 illustrations, are given to the promotion of improved animal and farm husbandry, under conditions the Kansas stockman and the Kansas farmer find ready-made or can make in their surroundings; to the furtherance of the dairy interests, through a higher appreciation of the cow, and her better management; and to encouraging the most approved systems of road-making. The succeeding 300 pages tell in careful detail the story of every township's achievements, annually, in the growing of each profitably important crop, its acreage and yield, and its value where produced; the number and value, by counties, of each class of live stock in each year; the mortality of live stock; the value of animals slaughtered or sold for slaughter, and of poultry and eggs sold; the population of each township and municipality; the assessed valuation of all lands, personal property, city lots and railroads; the date of organization of each county, its area, rank in population, and miles main-track railroad.

The biennial period with which the volume deals has been agriculturally by far the most profitably productive of any in the State's history, and the percentages of increase in values of products from Kansas soil, not alone in this period, but on an average for all the years mentioned, are so gratifying that every citizen and friend of the State may well feel proud of an identity with a commonwealth possessing such capabilities, and showing such results from developments as yet little more than begun.

When it is considered that the State consists of more than fifty million acres of land, practically all arable and fertile—a country sixty-one per cent. wider in extent than England, two and one-half times greater than Ireland, nearly three times larger than Scotland, ten times greater in area than Wales, and in the most favoured zone—and but a fraction of this utilised except in a limited way, and none of it nearly to its possibilities, it is patent that no prophet not inspired can foretell the riches in store for those fortunates who in the years to come shall possess a heritage so fruitful.

With her present progress, prosperity, and citizenship, and the bright future of which her many advantages give unquestionable assurance, Kansas is certainly occupying a most enviable position in the sisterhood of States.

Agricultural Co-operation.*

Rural Syndicates in Luxembourg.

Within the last score of years there has been a remarkable development in the way of rural co-operation in Europe, and the result has been a great improvement in the condition of all rural industries. In France, where before co-operation the farmer had great difficulty in "making ends meet," and did it only by the exercise of great self-denial, he is now in a fairly good position. Under co-operation everything that the farmer has to buy is secured at a much lower price than that of the open market, and he secures the full value of everything he has to sell. In respect to its area, there is no country in Europe in which the principle of co-operation in rural matters has been more extensively adopted than in the Grand Duchy of Luxembourg. In four branches, namely:—(1) creating new roads for opening up the country and improving the land; (2) buying artificial manures and agricultural machines and implements; (3) insuring live stock, and (4) establishing butter factories, there are 760 associations, having in all 43,568 members. This is a marvellous record, in view of the fact that co-operative associations are comparatively a new thing in the duchy, and the oldest of the butter factories dates no further back than 1894.

Land Improvement and Stock Insurance.

The making of roads to open up the country might not be regarded as a truly agricultural operation, though the great value of good and convenient roads to the farmer is well known, but when to this is added the improvement of the land on the *crédit foncier* principle, its importance may be gathered from the fact that there are 358 associations, numbering 27,000 cultivators of the soil, established with these objects in view. For the purchase of artificial manures and agricultural implements and machines 328 syndicates, numbering 12,000 members, have been established. These purchase at first hand from the manufacturer, and thus a very great saving to the agriculturist is effected. There are twenty-six mutual assurance societies for the insurance of live stock, which are affiliated to a central association. Notwithstanding a very low rate of insurance. these societies, which number 1,568 members, are highly successful. In 1900 they insured no less than 3,569 head of live stock for a total value of 1,082,420 francs. Butter factories were established in 1894, and from that time to January 1, 1900, they had operated on about 19 million kilogrammes of milk (about 4,750,000 gallons), which furnished 1,452,000lb. of butter. These butter factories, of which there are 54, numbering over 3,000 members, are federated in a

* Condensed from an article by M. L. Grandeau in the *Journal d'Agriculture Pratique*, by "Bruni" of the *Australasian*.

mutual association, the head-quarters of which is in Luxembourg. Inspectors, chosen and paid by the Government, visit the various dairy factories, to advise and assist the management in any way that may be required. Besides the foregoing, there are several other syndicates, many of which perform special functions of a highly interesting nature.

Roadside Fruit and Small Vineyards.

Towards the end of the year 1899 there was established in the duchy a special syndicate for effecting the sale of fruits. Of late years the cultivation of fruit-trees has been greatly developed. The severe winter of 1879-80 killed the greater number of fruit-trees in the country, entailing a loss of nearly seven million francs. Thanks to the assistance rendered by the Government, the trees destroyed were replaced by young ones, which are now in full bearing. The Government and the rural communes have in a large measure substituted fruit-trees for the ash and poplar trees on the majority of public roads as wayside trees. This experiment has proved successful beyond all expectation, and the result has been the formation of a syndicate for dealing with the fruits of the country and of these wayside trees. In 1899 apples to the value of 31,000 francs, and pears to the value of 28,500 francs, were sold by the syndicate from the road trees, making a total of 59,500 francs. This money is expended in maintaining the roads in good order. In September, 1900, a syndicate was formed with the object of treating in a central position the musts from the small vineyards in the adjoining districts, and to procure for the members the plant and tools necessary for the work of wine-making. The greatest care is taken to ensure the proper treatment of the grapes, and to prevent any deterioration or falsification of the must. So great is the desire to maintain the purity of the wine that any member proved to have falsified his wine is at once expelled from the syndicate. An advance is made to the members on the new crop at the rate of 4 per cent. interest, and when the wine is sold the amount of the advance with the interest due is deducted from the sum due to the member. Many of the vignerons in this neighbourhood have such small plots of vineyard that it would be impossible for them to properly treat their wines. Before the formation of this syndicate the small vignerons were obliged to sell their young wine directly it was made, and invariably at a very low price. By the aid of the syndicate it is brought out with every advantage, to the great benefit of the small vigneron. This syndicate, which began with only 27 members, practically does all that the Victorian wine-producers are asking the Government to do for them.

Schools of Housekeeping.

Quite as interesting, but not of equal importance with the syndicates mentioned, are the schools of housekeeping, of which there are ten in the duchy. Their object is to instruct young

women in the performance of all the duties required of a housekeeper on a farm. The pupils are admitted after they are 15 years old, and have received the certificate of a primary school. Each week in turn the pupils, in groups of six, eight, or more, perform all the duties that would fall to the lot of the farm housekeeper. These include neatness in the house, keeping the garden in order, care of the fruit, the work of the dairy, and the making of bread and pastry. During the week devoted to lessons in cooking, the pupils are exercised in the preparation of menus suitable to each season. On this subject, M. Grandeau makes the following pregnant remark:—"During this week the pupils eat no food but what they cook themselves." The excellent practical education given in these "Ecoles ménageres," M. Grandeau thinks, might be adopted with advantage in rural France.

Field Peas.

Peas are becoming an important field crop in Australia, and the Adelaide *Observer* published the following paper read on their cultivation and harvesting by Mr. Cornish at a branch of the South Australian Agricultural Bureau:—

"To grow field peas alone without any other crop that would benefit by the cultivation of the peas would not pay at present prices unless the crop was very good. I speak from experience, having grown peas on the same farm for forty years with varied results. Some years I have sown from 2 bush. to 3 bush. to the acre, and reaped about the same as sown. On one occasion I sowed 2½ bush. to the acre and reaped 40 bush. On another I sowed 834 acres and gathered 1,200 bush. Much depends on the weather. Sparrows are often very troublesome, destroying the plant altogether. Hot winds and caterpillars are responsible for much damage; but for all this the pea thrives well in the hills where there are good summer rains. We are more certain to get a good crop of wheat after peas than after fallow. Peas are saleable because they can be used for so many things—for feeding poultry, cows and horses, and are not surpassed for fattening pigs. Peas may be sown from June 1 to September 1, but July is the best month here. Three bushels of seed and 3 cwt. of bone manure to the acre should procure a good crop, especially if sown through a drill. The ground should be well harrowed and rolled that it may be in good order for the pea-rake at harvest time, which should commence when the pea stalk is yellow and soft, so that the peas when raked together may consolidate. No pea-grower should be without a pea-rake. If there are no peas in the pods and the straw is short, it will not gather them clean. It is the full pod catching and holding in the teeth of the rake that pulls them. The heavier the crop the cleaner the work. It is far superior to the

scythe. Three men and one horse with the rake will pull and put together from six to nine acres a day. If peas are not pulled when the straw is soft, the straw will curl and not go together, and the wind will get in, shedding the peas and carrying away the straw. Peas pulled with the rake will be loaded on the wagon in less than half the time than if cut with the scythe, and one-third more be put on the wagon each time. The carting and thrashing should be done in cool weather. The thrashing-floor should be 60 ft. in diameter, and should be got ready a month before thrashing, so as to harden. A floor 60 ft. in diameter will take a full wagon load at once. In thrashing, many people roll them out with a land roller; but they are generally too small, and drive the straw up in heaps instead of getting on top. The best way is to make a roller about 9 ft. long, 2 ft. thick at the small end, and 2 ft. 6 in. thick at the big end. A splendid roller can be made as follows:—Get two wheels, one small and one large one, knock the boxes out, and fit one wheel on each end of a piece of timber 4 ft. x 4 ft. x 9 ft. long. Fit the wheels on facing each other, cut the spokes off about 9 in. from the nave, bolt twelve pieces of hard wood 4 in. x 3 in. to the spokes, one end to each wheel, fasten a piece of fencing wire around each end, and, with a frame, you will have a splendid roller."

Mr. Jamieson agreed that peas were invaluable as a fallow crop. Mr. Cornish was the introducer of the pea-rake into this colony, to the great benefit of the pea-grower. Mr. Moore would scarify the ground in the late summer to destroy weeds before ploughing land for peas.

STOCK FARMING.

Shorthorn Heifer, Cicely.

Mr. Walter W. Chapman, Secretary of the National Sheep Breeders' Association, under date February 22nd, has favoured us with the following information in connection with the article on Shorthorn Beef Cattle which appeared in No. 2 of this volume:—

"It may be of interest to your readers to know that the heifer Cicely, with which our late Queen was so successful at the last Christmas Shows, and who was illustrated in your number for January 17th last, page 67, has been purchased for breeding purposes by Mr. W. D. Flatt of Hamilton, Ontario, Canada."—Editor.

Mohair Manufacturing in New England and Old England.

Our readers will find the following letter from Dr. Willard C. Bailey, of the firm of C. P. Bailey & Sons, one of more than common interest. Dr. Bailey, who writes from Bradford, Yorkshire, is fortunate in not only being thoroughly familiar with Angora goats and one of the most expert judges of Angora goats in the United States, but in having a good deal of practical knowledge of the manufacturing business. He will be in Angora in a very unpleasant season, judging from Mr. Harris' * experience, but his first visit will be at a time when the goats will be carrying full fleeces, which will offset the disadvantage of bad weather. Reports upon his observations in Turkey will be eagerly looked for:—

"Knowing that our mohair growers will be interested in the manufacturing of mohair in and around Bradford, England, I take the liberty of sending you a few notes. I am one of the firm of C. P. Bailey & Sons Co., of San Jose, California, and have been brought up in the Angora and mohair trade. I left California October 8, 1900, and met my father, whom you met at Salem and Portland last fall, at Chicago, Ill. Together we visited the Sanford mills at Sanford, Me., and the Massachusetts Mohair Plush Co.'s mills at Lowell, Mass. From New York, Mr. C. P. Bailey went back to California and I came to England. I shall visit Turkey before I return to America.

At Sanford, Maine, Mr. Geo. Goodall took great pains to show me everything of interest in his mill. It is a fine, big place, and after seeing the mills here in England, I must say it compares quite favourably.

Mr. Bliss, of the Massachusetts Mohair Plush Co., kindly gave me many practical points on Turkey and Turkish mohair.

Of course our mills are not so old and strong as those here in Bradford, but the machinery is the same and the energy and brains are not lacking on our side. Some of the samples of American plushes created quite a sensation amongst the merchants here. Mr. Amos Crabtree said: "I see now why we are not sending so much yarn to Germany. The Germans can't sell their plushes in America." I showed this same gentleman some samples of our mohair and he said: "Do you want to sell us some of that? If you do, I can find a buyer now." He rather questioned whether we raised much such mohair in America, but I can assure you it was only a fair sample of the Bailey clip.

There are a number of mills about here which are working almost exclusively on mohair. Mr. James Roberts, owner of the Sir Titus Salt, Bart. mills, of Saltaire, near here, kindly showed me through his mill. We spent the day there. They are employing about thirty-five hundred hands, and working almost exclusively on mohair. Mr.

* A noted Oregon goat-breeder, who introduced Angoras from Turkey into the States in 1876.—Ed.

B. Roberts said: "We make our living out of mohair." One of their spinning rooms was five hundred feet long. It was a grand room, absolutely fire-proof with its stone walls, cement floors and glass roof. Sir Titus Salt, Bart., built it years ago and it is still one of the largest spinning rooms in the world. We examined much Turkish and Cape mohair here. Mr. Roberts is a firm believer in the Cape. He thinks if the Cape hair "continues to improve," he can use eventually all Cape hair. At present he uses about twice as much Cape as Turkish. They make no plushes at this mill, only yarns and dress goods. I was impressed with the fact that some of our mohair compares very favourably with the foreign product. We will not need to look for a foreign market for our mohair, but in response to my inquiry, Mr. Thos. Hollis, of the Yorkshire Textile College of Leeds, the largest institution of its kind in England, said: "I know of no reason why American mohair could not find ready sale here. There will always be a demand for mohair for fine goods. I have studied the fibre carefully, and we are just putting in machinery to teach our students how to handle it." He took me through a very complete experimental mill, and it was very interesting to see men at work learning how to work. I thought it would be a fine thing if we had a school where we could teach men how to raise the best mohair.

There are many other large mohair mills here, and I have taken many pictures which I shall present to our breeders. I hope to get some good pictures of Turkish scenes and goats.

The fact impresses me that we are but in our infancy in the mohair business.

I go from here to Constantinople."

Angoras in Australia.

In continuation of the notice on the above subject which we reproduced from the *Queenslander,* on page 65 of this volume, the following is taken from the *Australasian* :—

"The Angora goat has never been popular in New South Wales, but the time is not distant probably when it will receive wider attention. In the United States and South Africa goats have of late years been superseding sheep, and, according to all accounts, mohair is more profitable than wool. In the mountainous parts of this colony the Angora goat would, no doubt, thrive better than the merino or any other breed of sheep we possess. As far back as 1832 a few Angoras were introduced into New South Wales by Mr. Alexander Riley, of Raby. They were purchased at Versailles, in France, and shipped via England, where Southey, the author of a work on colonial wools, saw them, and states that "this little herd consisted of the original stock introduced from Angora and Cashmere, with their respective crosses." In a few years this flock

increased to 300, and Mr. Riley exported three of them to the Cape of Good Hope, which sold there for £150. Subsequently, on a farm at Canterbury, near Sydney, a Mr. Campbell, M.L.A., owned a fine flock of these goats, and for many years Mr. John Black, of Muswellbrook, kept a flock of from 1,000 to 1,200 pure and crossbred Angoras, but they were removed from that place several years ago, and all trace of them has been lost. The late Mr. Keys, of Bengalla, also kept a flock of more pure type than those of Mr. Black's, which was imported from Victoria, and although he imported pure bucks from time to time they did not prove to be so profitable as sheep. Wool was dear in those days. This flock was ultimately sold to Mr. Aarons, of Dubbo. Near Singleton, Mr. R. Blaxland, of Fordwich, now owns a small flock of well-bred Angoras, which he considers will prove successful and profitable, if attention to proper sort of country be paid for them. At Glen Innes also, Mr. G. M. Simpson has kept these goats for some years, and they are said to thrive very well there. Inquiries are so frequently made as to where Angora goats are to be obtained in New South Wales that the foregoing information may probably be useful to many of our readers."

Again, in commenting upon the prospects of the mohair industry becoming in the near future an all-important one, as in South Africa and America, the *Sydney Mail* remarks:—

"The Angora or mohair industry in Australia must, in the near future, become an all-important one, as is so in South Africa and America, where the Angora numbers many millions, totalling 3,500,000 in South Africa alone. In those countries great progress in the expansion of the enterprise was made by crossbreeding with the common goat, which must be the method to be pursued in Australia, on account of the limited number of the pure type available. The progeny thus bred are found to be even more prolific than the pure-bred animal, and the flesh is a great improvement upon the common meat, so much so that in both of the former countries mentioned, and in some of the most populous portion of the States, it is becoming quite an important meat food. The peculiar fact concerning this method of breeding—which is now being entered upon to some extent in the northern portion of South Australia—is that it is unnecessary to pay any attention to the colour of the does used, because their progeny, even from the first cross, are invariably white. In South Africa it is customary to shear the second cross, which yields from one to two pounds of mohair, while every succeeding cross becomes more valuable respecting both quality and quantity.

The first person who may be said to have made a success of this industry is Mr. E. A. Scammell, of Adelaide, South Australia, who some years since established a stud of the pure-bred animals on his estate, Punyelroo, near Mannum. They were found to thrive remarkably well on his estate on the River Murray in that colony. The class of country is open grassed and limestone plains, sparingly timbered with sandalwool, pine, and a little bush, occasionally

intercepted with belts of mallee. Most of the salt and other bush has unfortunately been exterminated in past years by the ravages of vermin. On the flats adjacent to the Murray, however, much of this want has been replaced by a small creeping variety of the same natural order, which alone is sufficient to provide enough saline vegetation to ensure the healthy vigour of the Angora, where the freshest of water alone is available.

The Angora, if properly handled, will thrive in any place where it is sufficiently dry, and where there is a certain amount of saline herbage or salt provided, or a variety of feed, either grass or bush. It is, however, essential to remember that its nature more resembles that of the large cattle than that of the sheep. They are very timid animals, more easily becoming wild than a sheep, and more unmanageable when they are wild, but also more readily tamed and kept so.

In fostering the natural instincts of any of the domesticated animals, by depasturing them in rough and hilly or wild country, or neglecting to give them sufficient attention to keep them quiet, one cannot expect them to thrive. This more especially applies to the Angora, and the more domesticated the more profitable they become. It is a mistake, however, to give them too much attention at time of kidding. The best plan to adopt after getting them nice and quiet is to let them settle themselves on the one beat, by herding for a day or two, and then interfering with them as little as possible. It is in this way that Mr. Scammell has been so successful in their breeding. They usually breed once a year, commencing in August. They have one, two, and occasionally up to three kids at a time. The average percentage may be said to be about 100, and it is not at all unusual for does under twelve months to rear either one or two kids. It is considered an advantage to breed from them at these early ages, because the quiet motherly instinct, which is of great importance, becomes more fully developed. It is gratifying to view the prospects of such a valuable industry so applicable, as this one undoubtedly is, to the largest portion of the Australian colonies, especially as we are assured that the more mohair the world produces the steadier the prices become and the more its place is secured as one of the staple commercial products of the world's consumption. One great advantage to our pastoralists embarking on this industry, in the most arid regions especially, is that when sheep are dying of starvation they would always have fat flesh for human consumption, besides having the eggs divided instead of carrying them all in one basket; for the profitable return from the mohair would often be welcome when prices of wool were low and everything failed them. It is an old but true saying, "A goat will live and thrive where a sheep will starve." It is also interesting to note that we are at last gradually awakening to the fact that there are other doors to fortune still open to us, while in this particular line we have, as a starting point, the best blood and quality procurable in the world, which is an all-important factor in the cross-

breeding of the Angora with the common goat. The recent inquiries for high-classed animals from America and South Africa—where it is not unusual for an exceptional buck to fetch as much as £500—says much in support of the Australian-bred animal, and it is to be hoped that before long Australia will occupy the same important position in respect to the Angora as it does to-day regarding the all-important merino wool industry, which has to no small extent been responsible for raising Australia to the proud position she occupies to-day."

Goats as Leaders of Sheep.

"On an average a Mexican sheep flock numbers about 2,000, and there were ten or more billygoats with every flock I saw on the range," said A. C. Grimshaw, who recently returned to New York after a six months' stay in Mexico and the West. "I learned that the goats are kept with the flock as leaders. Being venturesome and intelligent, they will go anywhere the shepherd directs, and the silly sheep, who might otherwise balk or stampede at some trifling obstacle or alarm, follow them unhesitatingly. The goats set the pace for the flock, as they are brisk, untiring walkers, keep the sheep on the move, saving the shepherd much trouble.

"The Mexican shepherd also has his dog, though not a true blue, clear-cut, handsome animal like the Scotch collie. The dogs are mongrels, in all varieties and degrees, the only point of uniformity among them being their extreme ugliness in appearance and indisposition toward strangers. Some are shaggy beasts with pointed muzzles, and might at a little distance be easily mistaken for wolves. But ugly and mean as they are, the Mexican shepherd has the art of taming them so that they are as serviceable as is the collie to the shepherd of the Scottish moorlands. The Mexican sheep dog is loyal to his master and quick to understand. Many a Mexican shepherd owes his life to his dog, who notified him of the sneaking approach of hostile Indians or of their ambush in his path ahead.

"Returning to the original subject, a pair of goats once led a flock on a long journey. A shepherd of Valencia county, New Mexico, away from the home camp, had the misfortune to lose his dog through the attack of a mountain lion and to break his leg on the same day. Had the dog been alive he could have sent him to the home range to summon assistance. As it was, he had to see the sheep wander away, while he dragged himself to the place where his provisions were stored, and waited for such help as chance might bring him. Five days later the sheep, led by the corporal goats, appeared at the home ranch, eighty miles away. They had crossed two mountain ranges by a path of their own finding, and out of a flock of 1,900 sheep only seven were missing. There was, of

course, much good luck in this, for a dash of timber wolves among them would not only have meant the killing of many sheep on the spot but would have scattered the rest of the flock far and wide. The marvel was the intelligence of the goats in returning by an unfamiliar path to the place where they had been bred, and the implicit faith of the sheep in their leadership. Of course the arrival of the sheep at the home ranch led to the sending out of a searching party for the shepherd. He was brought in on a litter right between two donkeys, and, although his injury had become very painful through neglect, proper surgical treatment brought him around all right."—*Texas Stock and Farm Journal.*

Prepotency and the Making of New Breeds.

Stock farmers, and others interested in breeding problems, will be glad to have placed before them the following able article contributed to an English paper, *The County Gentleman,* by "A Breeder":—

Darwin was the first to point out, probably not the first to notice, that when two greatly differing kinds of the same species bred offspring the latter did not appear to blend the two parental kinds into one mixture, but took after some remote common ancestor. This is "reversion," and therefore reversion can to an extent be caused at will by the breeder. But reversion is generally exactly what the breeder of domestic animals does not want to produce; for it may be to ancestors so remote as to make it problematical whether any of the desired characteristics of breed will be maintained. It may, on the other hand, be to near ancestors, and may be called up by much less drastic means than that contemplated above, and it may be then of material use to the breeder. We know that violent crosses produce violent and uncontrolled results; and if, therefore, we can by less violent changes produce controlled results or partially controlled effects, that is the stage of breeding most to be desired. I say stage of breeding because we have never yet in any breed of domestic animals arrived at a stage when change of variety ceases. Something is always occurring to create change, and it appears from this that the first law governing the animal kingdom is that of variation. The breeders of all varieties of pure-breds have set themselves the task of combating this first law in Nature. They aim not only at breeding two alike, which, by the way, has never yet been exactly achieved, but of breeding whole flocks and herds alike. But there is a difference in the aims of breeders of various species; for instance, the breeder of racehorses and greyhounds breeds for change, but change always in one direction; that is to say, they follow the law of Nature, and are its obedient servants, whereas cattle-breeders and

fanciers of all classes breed around a fixed type, and although change does take place very rapidly, it is against their wish and desire. The choice of mates for what they can do is something like the law of the survival of the fittest, discovered by Darwin; but the selection of mates for what they appear to the eye to be is not based on the previously mentioned law, and consequently variety comes in a direction that is least wanted. Inbreeding is the expedient by which breeders seek to prevent change; and by this means they establish a type which it is hard to break down, so that a cross with it upon another variety will result in the inbred individual dominating the characteristics of the offspring, unless the cross is too violent, and reversion is set up, as it were, by repulsion—the non-union, or refusal to blend, of two antagonistic varieties.

According to Mr. Galton, the two parents contribute one-half towards ancestral heredity, the four grandparents one-quarter towards it, the eight great grandparents one-eighth, the sixteen in the next generation one-sixteenth, and so on. This may be called a natural, as well as a mathematical, rule of breeding, and probably it holds good when parents are in no way related to each other, and also in no way unlike each other: but as these conditions never do happen, the rule itself can never be applied except in its many variations. We have seen that if violent unlikes beget offspring, the first part of the rule breaks down at once—the parents appear to have little or no influence on the characteristics of their offspring. It is therefore fair to surmise that if unlikeness destroyed the influence of parents that likeness between them would, on the contrary, accentuate it, and this is believed to be a fact. But there are cases in which unlikeness does not result in the manner described, and therefore it is open to question whether likeness in the parents always acts in one way either. As to unlikeness, when a pointer and a setter are crossed together the young are called droppers, and in appearance they are not reversions, but, on the contrary, apparently pure-bred setters and pure-bred pointers, although born at the same time. This is very remarkable, and it is apparently open to us to adduce a law of Nature from it, and to restate Mr. Galton's law with this variation. The two parents will influence the offspring between them by one-half; but this half may come partly from the two or wholly from the one, and when it comes from one the ancestry of the other has slight, if any, apparent influence, whereas the ancestry of the influencing parent is great in proportion as the other's is little. But although it often happens that the external appearance of the dropper is that of pure breed, the descendants from it may revert to the other type, and show a distinct cross, although descended from pure blood in an animal of similar appearance to the dropper parent —that is, two similar parents, one of which is of crossed blood, may have offspring which revert to the crossed blood. It, therefore, follows that one grandparent may influence the appearance more than both parents together; and Mr. Galton's law is again honoured by the breach of it. These are curious contradictions of every law

except one—that one named above as the first law in breeding, that everything makes for variation, and that no breed can stand still.

Prepotency of some animals is a generally admitted fact; and it might be said that constant variation cannot be a law if there are instances in which similarity of offspring is constant from one parent, no matter how the other parents differ from the prepotent one. But Mr. Galton thinks that prepotency is a highly hereditable "sport," and Professor Ewart shows that it not infrequently accompanies other kinds of "sports." These sports may be termed spontaneous variations from type without apparent reason, and when they are, as he says is common, accompanied by prepotency, we see the very quality of the greatest constancy working in the direction of change and variety. It was asked by Lord Salisbury (I think it was) how new varieties could possibly be formed by sports. He imagined that one sport would have to seek out another similar sport of opposite sex before a new type could be evolved from their union. But Professor Ewart is of opinion that the second sport would not only not assist to establish a new type, but would be in the way of it; that prepotency accompanied by a sport would stamp itself all the more effectually because its mates were not sports and not prepotent. So that, instead of prepotency always being a means to similarity of individuals, it may be a means to new varieties, and may have been a cause of new species rising out of old and pure-bred races. Prepotency is not always a sport, but may be the result of continuous breeding to one type and likeness for many generations, and when it is so it is again a means to variation, although the reverse is commonly said of it. Bred to animals of its own breed and likeness, it causes decay and loss of constitution, whereas the similarity of offspring to the prepotent individual, if it exists, is not and cannot be recognised by reason of the similarity of the other parent. If, on the contrary, it is used on other races it causes variations from those races to greater extent than if prepotency had not existed. For instance, if we assume a Shorthorn herd and a polled Angus bull amongst them, the calves will be to a great extent of the polled Angus variety, and when these grow up, and breed in their turn, to other representatives of the original herd, the polled Angus blood will require much more wiping out than if the first cross of that breed had not been prepotent. So that prepotency is a cause of variety in outbreeding, and not always a cause of similarity in inbreeding.

Inbreeding is said by Professor Ewart not to induce sterility, but in some races it unquestionably does so. Crossed animals are more fertile than inbred ones, and, on the other hand, hybrids are frequently sterile. It seems that violent crosses between varieties create reversions to the likeness of vigorous mature ancestry; whereas crosses between far-removed species revert further back, and sometimes to immature as well as remote ancestry. For instance, the stripes upon Professor Ewart's zebra and horse hybrids are not the stripes of the sire, but those similar to the adults of a totally different species of zebra; and also are more like the pure-bred

young of the father—Burchell's zebra. That is, they have shadow stripes between the others, and some of these are as distinct and dark as those stripes which in them represent the distinct stripes in the pure-bred, so that they have more stripes, and smaller ones, than their sire the zebra. Moreover, their seed germs are immature, and consequently they are, or were for a period longer than horse colts would have been, sterile, and perhaps remain so, like mules.

In crossing sheep in France, it was found that the bad breeds (by which is meant those which have not come under the influence of high feeding) were prepotent over the better breeds, and that crossing was a failure. That was got over by breeding together two different sorts of country breds, and so breaking down prepotency, and when this was done the crossbred ones bred good produce to the highly-bred sheep.

Professor Ewart adopted the same plan with three varieties of tame pigeons, but instead of the thoroughbred showing his influence over the crossbred parent, the offspring reverted from the mixture of three fancy types to the original blue rock ancestry of all.

These are but a few instances out of multitudes which go to show that if there is any law in breeding besides that of variation, its exceptions must be more important than the rule itself.

Professor Ewart, unlike Herbert Spencer and many others, is not a believer in telegony. He does not believe that the influence of a previous mate affects the offspring of a later one. English breeders are not with him in that, but it must be said that he has studied the question much more systematically than they have. I mention it to remark that if there is anything in it there is additional ground for believing that variation is the only constant law in reproduction of species. Against this law we have it asserted that "like begets like," and we have the undoubted quality of family likeness to deal with. Breeders of cattle in particular have made the most of that, and have bred from brother and sister with the best possible results. They have established families alike in character, but not always alike in colour, and they have done it by a good deal more inbreeding than goes on in Nature, but the horsebreeder cannot follow their example, because his object is to increase muscular vigour, and their practice has been to diminish it. The muscles that win the Derby are not of the marbled beef order; and while decadence from the active vigour of the original wild cattle is the delight of the breeder, increased muscular vigour is looked for in the horse with every new generation. It is admitted that the thoroughbred has increased 3 in. at the shoulder with every century. We, in our day, can see the Arab increase 2 in. in a generation under the artificial conditions which surround all horses, except mountain ponies, in this country. There is certainly as much difference between the thoroughbred of to-day and the Darley Arabian as there is between the Shorthorn and the European bison. But the transformation has been in different directions; one in the increased power of doing work, and the other in the increased power of feeding humanity on marbled

beef. I wish to accentuate this difference, because there is some belief that, by means of inbreeding, a race of ponies having all the vigour of thoroughbreds can be maintained at one standard height. But close inbreeding results in loss of vigour and loss of height, and in variation from originals, although it results also in family likeness. Crossing, on the other hand, results in vigour, increased size, and, after the first generation, in the blending in chance degrees of the two types crossed. In the creation of new breeds of horses the only point of advantage that can be gained by inbreeding is therefore family likeness; but in order to retain vigour we cannot have that close inbreeding that insures family likeness.

It appears, therefore, that if we cannot create a useful prepotency by inbreeding we must wait for it if we desire family likeness and new breeds of horses. As Mr. Galton says, prepotency is a sport itself; as Professor Ewart says, it accompanies other sports, and, consequently, when a sport appears in the exact shape of what is wanted, being itself a chance variation from its breed type, that will be the animal to make much of for the creation of a new breed. But in order to know it as a sport, with its valuable quality of prepotency, it must be of a pure race. That is to say, if it were the result of a blend of two or more sorts it would not necessarily be a sport at all. It might be the exact one-third of each of three sorts, and might reproduce any one of them, or any two, in any differences of proportion of each.

The ordinary barn-door fowls are well-known instances of the possible variations in crossbreeding. There is every type and colour represented, but there is never anything really distinctive except the reversion in colour and markings to the jungle fowl, or the black-breasted red game fowl, that is, to the original ancestral type of all the varieties, or to what is believed to be so. The barn-yard may be said to confirm Galton's law, with this difference, that whereas every one of the eight great-grandparents is supposed by him to have one-eighth influence on each descendant, it has no apparent influence whatever on seven, and an overpowering influence on the eighth. It takes an old man's lifetime to make observations of this kind in horsebreeding, because of the length of time the horse lives and breeds, but there is nothing known about horses that in the smallest degree upsets the common knowledge gained from the poultry yard.

But there is another consideration that still more involves the intricate problem before the horsebreeder, and it is that the children of the horse differ according to the age of the horse. This is generally admitted by the universal objection to breeding from aged parents, and the general idea that too much must not be expected from the first-born of very young parents. It is not safe to accept the view that features and characteristics acquired in a lifetime are not inherited. In no other way could instinct be in the first instance transmitted. For instance, how did the habit of pointing and backing naturally first come into the breed of pointers? That is, how did the short pause before the spring of the wild animal come to be

developed into a steady point without any ulterior object? It may have taken many generations to get it fully developed as we see it, but as long as acquired habit was transmitted to some extent, that is all that is necessary to the point under discussion. If it is admitted, and I see no way out of it, then in theory, as in practice, the offspring must vary with the age of the parent. If this is so, then age in the individual is equivalent to several generations of young individuals in stamping character, and the question arises—Is it not better to go breeding from an old animal than from his descendants? that is, when circumstances permit, and inbreeding is no greater in one case than in the other.

I have never seen the following observations of my own confirmed by those who have given attention to the matter, but I will nevertheless quote it for the sake of getting it confirmed. It is that half-brother and sister beget apparently more inbred offspring than full brother and sister do. I have often observed the failure of such animals as are bred to do something when the former plan is resorted to. I look at it in this way: the produce of A and B and of A and C are mated, and the inbreeding is then entirely to A, whereas when the mating is between the produce of A and B there is a balance of inbreeding, and the influence of sire and dam are not swamped by either A or B.

There is a general opinion that if an Arab were bred to a Shire mare the produce would have the lumbering long head of the Shire and spindle shanks of the Arab; but these views are based on breeding from crossbreds on one side and not from pure-breds, and that factor upsets all calculation. It would probably take several generations of bad breeding before the above results could present themselves from pure-bred animals on both sides, however different they were, because, as a rule, violent crosses do not blend in the first generation. Offspring may follow either pure-bred parent or may revert.

It is probable that no crossbred animals can be used to establish a breed of polo ponies with success. It can only be done with similarity of results by breeding Arabs up to the height required, or by breeding thoroughbreds down to it. Crossbreds have this great objection, that as the breeder never knows what will probably be bred, he never knows how, or in what direction, to influence results. If, on the other hand, he knows what the tendency is, as in the case of the Arab, to come too small and with bad shoulders, and as in the case of the thoroughbred to come too big, he knows how to set about improving the chance of what he wants to get in each case. But he is hopelessly defeated when, having regard to the last foal of the half-bred which might have been too small, he provides the best of good living for the mare again in foal to the same horse, and is presented with a near relation of the shire horse for his trouble, when his aim has been a pony of thoroughbred character.

The lesson of those animals which have more than one young at a birth should not be thrown away. It is seen there that exactly

similar conditions produce a great variety of results. It is, therefore, probably not external condition which causes a half-bred mare to breed a cart-horse to a thoroughbred stallion, and quality to a cart stallion, and such extreme examples are not uncommon. The point of this is that nothing the breeder can do will establish uniformity of breeding from the half-bred, and even if he has the luck to find a prepotent stallion, such variations as were preordained will be the half-bred mare's contribution towards the offspring. The more they all follow the prepotent sire the less preordained variation between them will be apparent, because less will be inherited from the female side. It is necessary to remember, after having discovered the desired prepotent "sport" stallion, that one swallow does not make a summer, and that it will require a succession of such "sports" for several generations to create a new breed of horses or ponies.

Polo has collected a large number of ponies all of one type, but if it were attempted to breed similar animals from any two of them the results would be doubtful. And if in years to come the whole of their descendants should be blended into one family group the results of breeding would then be less doubtful; but how many generations will it require to obtain such a blend?

Endurance of American Horses Under the Saddle.

The following article by Mr. E. B. Clarke appeared in the Twelfth Biennial Report of the Kansas State Board of Agriculture:—

"There is much of interest to riders generally, but particularly to United States cavalrymen, in reports that have come from South Africa of some of the long, hard rides made there by the British mounted troops. The account of some of these rapid forced marches of cavalry are lacking in detail, but the specific statement is made that a squadron of the Natal Mounted Rifles recently rode eighty-five miles in twelve consecutive hours. The English press speaks of rides of sixty miles by detached cavalry troops which are completed within the limit of the daylight hours, and these achievements of the troopers and their mounts are spoken of as though they were of frequent occurrence At first thought it may not appear that these rides are particularly remarkable, but the fact must be taken into consideration that bodies of troops and not single individuals are concerned, and where this is the case the rapidity of the march must necessarily be gauged by the rapidity and endurance of the poorest horse in the outfit. Moreover, each animal engaged has to carry weight of man and equipment to an average amount of 250 pounds. Many of the horses used by the English troopers are American bred, and a natural interest in this country is added to the rides, for it gives a chance to "get a line" on the endurance of the American animal under absolutely strange climatic conditions.

No army in the world, perhaps, has had the same opportunities to test the endurance of cavalry horses as has the small regular force of the United States. The long, level stretches of the plains*, and the activity of the marauding Indian mounted on his tireless broncho, have been the conditions which gave to Uncle Sam's cavalryman his matchless chances for long forced, mounted marches. Col. Theodore Ayrault Dodge, U.S.A., collected the official records of long-distance cavalry rides, and has made them public, so that they may be compared with the performances of the soldier horsemen of other nations. Col. Dodge declares specifically that he has rejected all "hearsay rides, of which there is no end," and has accepted only those proved by official reports. Colonel Dodge says that Capt. S. F. Fountain, United States cavalry, in the year 1891, with a detachment of his troop, rode eighty-four miles in eight hours. This record is vouched for, and is better than that of the Natal Mounted Rifles by about four hours, the distance being within one mile of that made in South Africa. For actual speed this forced march stands, perhaps, at the head of the American Army record, though other rides have been more remarkable.

In the year 1897, when the Utes succeeded in getting some United States troops into what was afterward known as Thornburg's "rat hole," several mounted couriers succeeded in slipping through the circling line of savages. All of them reached Merritt's column, 170 miles distant, in less than twenty-four hours. The exact time was not taken, for, as Colonel Dodge puts it, "rescue was of more importance than records."

It must be understood, of course, that all these American rides were made without changing horses. The steed at the start was the steed at the finish. The best rider according to the cavalry experts, is not the man who takes a five-barred gate or who can ride standing, but the man who by instinct feels the condition of his horse, and, though getting the most out of the animal, knows best how to conserve his strength. Colonel Lawton, in 1876, rode from Red Cloud agency, Nebraska, to Sidney, in the same state, at a distance of 125 miles, in twenty-six hours. He was carrying important dispatches for General Crook, and though the road was bad his mount was in good condition when Lawton, looking five years older than he did the day before, handed over his bundle of papers to the black-bearded general.

General Merritt has a forced-march record that has no American parallel when the conditions of his journey are considered. He was ordered in the fall of 1879 to the relief of Payne's command, which was surrounded by hostile Indians. Merritt's command consisted of four troops of cavalry, but at the last moment he was ordered to add to his force a battalion of infantry. The "dough boys" were loaded into army wagons drawn by mules, and with the cavalry at the flanks the relief column started. The distance to be

* Very different to the uneven physical aspects of Natal.—Ed.

traversed was 170 miles, and it was made, notwithstanding the handicap of the wagons, and trails that were muddy and sandy by turns, in just sixty-six hours. At the end of the march the troopers went into the fight, and in the entire command not one horse showed a lame leg or a saddle sore.

Four troopers of the Fourth Cavalry, who had volunteered for the particular service, were sent in the summer of 1870 from Fort Harney to Fort Warner with dispatches, and were told to make the best time possible without killing their horses. The men were on their mettle. They made the distance, 140 miles, twenty miles of the way being through loose sand, in twenty-two hours, the actual marching time being eighteen hours and thirty minutes. At Fort Warner they rested one day, and returned to Harney on the same horses at the uniform rate of sixty miles a day. Capt. Edmond G. Fechet started at midnight for the relief of the Indian scouts who had been sent out to arrest Sitting Bull, and who, after killing that chief, were beleaguered in a log hut by his followers. Fechet took an ambulance wagon and a Hotchkiss gun with him. The gun carriage broke down and he was compelled to fasten the trail of the piece to the tail-board of the ambulance and thus drag it along. Notwithstanding this handicap, he made the first forty-five miles in less than seven hours. He fought and drove off the young Sioux bucks, and then scouted the country for ten miles, gave his troopers some breakfast and then returned to the fort. Fourteen hours were consumed in covering ninety miles of ground.

The cavalry horses of the American army have undergone these endurance and speed tests carrying weights of more than 200 pounds, and without any training other than that received in the ordinary course of frontier scouting and daily drill evolutions."

Shire Horses.

For the illustration of Lockinge Albert, taken without parade decorations, we are indebted to the *Live Stock Journal*, which states "he was foaled in 1894, and that he is remarkable for his shire horse characteristics, his feet joints and feathers leaving nothing to be desired, and his progeny are rapidly coming to the front in the show yards." He is a fine representative of this grand breed of horses, which at present are engaging a great deal of attention in England, and selling at high prices. At an auction sale, a few months ago, of a famous stud, forty mares and fillies realized an average price of £200 each.

It is stated by some authorities, that the Sheltie pony and shire horse are descended from the same ancestry; their difference in size being caused by the difference of the treatment to which they have been subjected, and, more especially their

SHIRE STALLION LOCKINGE ALBERT.

THE PROPERTY OF MR. J. H. BRYARS, SHEFFIELD, YORKSHIRE. PRIZE WINNER AND SIRE OF WINNERS.

feeding. Whether this be the result of treatment over generations and ages of time, it is quite certain that in the case of the shire, generous feeding has had very much to do in producing the large and handsome horse of our day. Such horses, Lockinge Albert amongst the rest, form object lessons which enforce the teaching that to breed fine horses, brood mares and colts must be well cared for, for if poorly fed in their younger days no amount of feeding and care will make up for it. If in the colt the muscles are not well developed and the bones grown to their full size they will not be in the older horse afterwards.—EDITOR.

Jibbing Horses.

JIBBING IN HARNESS OR "STICKS."

In an article in the *Live Stock Journal*, on the training and management of horses, the following reference is made to jibbing in horses. The writer says:—

"Ninety per cent. of the jibbing horses we see amongst us have been made to jib through carelessness by overloading them at first. Nothing will spoil a colt sooner than by making him pull a load for which he is physically unfit. He will struggle and strain for some time until he feels it is too much for him, when he will stop, and run backward to relieve his shoulders from the pressure. In future, he will be shy to start another load, if, indeed, he will draw an empty cart.

All those who have had the experience of a jibbing horse know well what an unmanageable brute he is when thoroughly confirmed in this bad habit. Neither coaxing nor whipping will induce him to pull when he takes it into his head to refuse; and we have known a pronounced jibber stand for several hours before he could be compelled to start. We have even seen a jibber so determined that he would throw himself down when punished, necessitating his being unyoked, which is always a bad example, as he will repeat it when ever he is punished, knowing that in doing so he will be relieved from work.

HOW TO START A JIBBER.

We shall describe a simple method, which, when applied by good hands, will generally be effectual in mastering a jibber when all other treatment fails—viz., *to convey to him for the moment the artificial idea that he is wanted to go in the opposite direction to that in which he is being driven.* But while this matter is comparatively simple in practice to a good horseman, it is very difficult to reduce to print; for, as already pointed out, different temperaments require varying degrees of treatment, even though the treatment in the main be the same. All the circumstances of the case must be considered—the place, the time, and the nature of the position. The moment the horse stops the driver should turn him abruptly round, and impart to him the notion that he is wanted to go the opposite way. The driver should give him a series of similar rapid turns, and then face him sharply in the original direction, and he will generally do as desired. If he should still remain obstinate, however, the driver must repeat the lesson with greater severity, and wheel him rapidly round again and again, according to the nature of the ground, and in a very short time he will be glad to go straight forward in the direction indicated.

PREVENTIVES OF JIBBING.

Shy-starting horses should always be harnessed a quarter of an hour at least previous to yoking them.

A number of excellent horses will not throw their weight into a cold collar, thus it is an advantage to warm the collars previous to yoking the horses. In the case of colts it is a good plan to lightly oil the inside of the collar before putting it on. By this, the pressure of the collar will not be so hard on the shoulders, and they are less likely to be injured in consequence. Jibbing, like most other bad habits acquired by horses, is more easily prevented than cured; indeed it is doubtful if a confirmed jibber can be thoroughly cured. In the hands of some men they will behave all right and do an enormous amount of work, whilst with others they will scarcely tighten a trace. Great patience and tact are necessary in successfully working jibbers. As soon as a jibber is yoked he should be driven off at once, care having previously been taken to place the trap so as to give the horse every advantage of the ground in starting.

He should never be pulled up at the foot of hills, but should be allowed to ascend them in his own peculiar way. Many horses will negotiate hills at a trot or a gallop that will not walk up them. In such cases they should be compensated by being allowed to walk down hills so as to regain their wind. Generally speaking, tact and not force is the secret of success in working pronounced jibbers. Such expedients as thrashing, rubbing the legs with rough cord, kindling fires beneath them, and a dozen other absurdities, are simply barbarous and of no practical help whatever."

HORTICULTURE.

Grafting Oranges on Bitter Seville Stocks.

In connection with an article under the above heading in the *Agricultural Journal* of the 1st March, 1900 (vol. xvi., No. 5, p. 305 *et seq.*), the accompanying letter from Dr. Newton B. Pierce, the Pacific Coast Pathologist of the United States Department of Agriculture, together with Memoranda by the Government Botanist and Government Entomologist of this Government, are published for the information of citrus tree growers and others interested :—

Office of the Government Entomologist,
Department of Agriculture,
Cape Town, 6th March, 1901.

BITTER SEVILLE ORANGE STOCK.

The Under Secretary for Agriculture.

The unsuitableness of the Bitter Seville stock for some varieties of orange, particularly the Washington Navel, in this Colony has led to my having been frequently questioned by fruit-growers as to whether that stock was used at all in the great Californian orange orchards. I have also been questioned in regard to the Californian practices relative to the foot-rot disease (*mal di gomma*).

To get the most reliable information obtainable in answer to these questions I recently addressed Dr. Newton B. Pierce, the Pacific Coast Pathologist of the United States Department of Agriculture. The accompanying letter has just been received in reply, and it contains sufficient of general interest to our fruit-growers, I believe, to warrant its being published in our *Agricultural Journal.*

In explanation of Dr. Pierce's remarks, I may mention that Messrs. Swingle & Webber, two other officials of the United States Department of Vegetable Pathology, recommended in their "Principal Diseases of Citrous Fruits in Florida" that the sour orange be used as the stock for the sweet orange where resistance to the foot-rot was required. Their whole article on the foot-rot was republished by us with the mention that the Florida Sour Orange was identical with the common Bitter Seville. Recently, however, the identity of the two was questioned by one of our leading nurserymen, and therefore, in writing to Dr. Pierce, his opinion on the subject was solicited. The Washington Navel variety is said to have proved unprofitable in Florida and is not grown there commercially; this fact is sufficient to account for the lack of mention in Messrs. Swingle & Webber's article that the sour orange was unsuitable as a stock on which to work it.

Riverside, the locality where Dr. Pierce states the sour orange to have proved unsatisfactory as a stock for the Washington Navel, is the greatest of the Californian orange sections; one-half the orange trees of the State are said to be there. Washington Navel is the chief sort grown aside from seedlings, and sweet orange, I was told, is the common stock.

It is evident that foot-rot is a far less serious malady of the orange tree in California than with us. In some of our districts, the disease has been observed to steadily progress from orchard to orchard along a valley and irretrievably ruin almost every tree on sweet orange roots within a few years of gaining entrance to the orchard.

Chas. P. Lounsbury,
Entomologist.

ANNEXURE 1.

Letter from Mr. Pierce to Mr. Lounsbury.

Your letter of the 24th ultimo has just reached me. I may say, relative to your first question, that there are but few groves of oranges in California worked on Florida sour stock, and thus far the practice has not been popular here. It has been tested for quite a number of years about Riverside, but few growers, if any, are satisfied with the result. My personal view is that this stock is not well suited to the Washington Navel. Relative to the identity or non-identity of the Florida Sour Orange and the Bitter Seville, I would say that the evidence is that they are the same. It is held that the bitter orange was introduced into Spain by the Moors and into the West India Islands by the Spanish, and that from these islands it became established in Florida and became wild or escaped. Webber and Swingle also place the Florida form under *Citrus bigaradia*. The French know the Bitter Seville by the name *bigaradier*, and Risso calls it *Citrus vulgaris*, which latter name is adopted in some late works. I find no facts leading me to suppose that the forms are distinct, but it may naturally be supposed that wild seedlings will

vary in some localities from those grown for long periods in other localities but, so far as I am aware, there is no known variation of the wild Florida type making it in any way more valuable to graft upon or bud than the Bitter Seville.

Relative to foot-rot (*mal di gomma*) I may state that it is only rarely that it is serious here. The use of sand about the crown of trees not affected, to admit of entrance of air, the exposure of the base of the roo's to the air when first affected, and the treatment of the affected parts with 30 per cent. crude carbolic acid usually brings the trees out all right. Free entrance of air and an open condition of the soil with no excess of moisture about the tree crown at any time are leading points to keep in mind if the trouble would be avoided. It may be avoided, in this region, in nearly all cases if these recommendations are well followed.

I am much pleased to hear from you and to see that you reached the other side of the world safely, and I hope you had a pleasant trip. I shall be glad to hear from you at all times, and trust you will call upon me for any facts which I may be able to give you in our related lines.

Very sincerely yours,

NEWTON B. PIERCE,
Pathologist in Charge.

United States Department of Agriculture, Washington D.C.,
Santa Anna, Cal., Jan. 26th, 1901.

ANNEXURE 2.

REMARKS BY THE GOVERNMENT BOTANIST.

Dissatisfaction of Recent Orange Growers with Bigarrade Stocks.

I find the younger men, who have quite recently taken up the multiplication and growing of citrus trees, are swayed in their choice by the rapid and handsome growth produced by the lemon stock at the outset. This was precisely the case with their predecessors. Then, in due time, came the disappointing sequel when in 1868-1870 a murrain seemed to affect the European orangeries and the trees died wholesale. The same fate befel the citrus orchards of New South Wales and New Zealand a year or two later. I have not found any Cape orange growers who advocate the lemon stock, at all acquainted with this bit of history of their craft, nor are they willing to read of it. The lemon stock fulfils a trade advantage, and so supplies a motive for its employment. *Caveat emptor* is a rule of universal use in other trades besides the nursery business.

But it is for the buyer to consider, and the large planter to consider whether he will be satisfied with short-lived and delicate trees, simply because of their early beauty and precocity. Let the published facts respecting the matter of stocks be reviewed, say in the U.S.A. Consular Reports of 1889-90. These were put before the Cape growers in the *Agricultural Journal*, vol. iii., p. 202-217, in a condensed form. Here are some of the facts :—

Tangiers. "When stocks are specially raised, recourse is invariably had to the Bigarrade or Bitter Seville orange, which is of all others the hardiest, secures the greatest abundance of fruit and is less liable to insect plagues."

Paramatta, N.S.W. "I commenced grafting on bitter orange stocks many years ago and find them looking healthier than others. If you keep on grafting on lemon, the quality of the fruit deteriorates and the scale increases. To this pest there is no citrus so subject as the lemon, and none so free from it as the bitter orange."

Genoa, Italy. "Before the malady *la gomma* manifested itself the trees were mostly layered for multiplication. But now the Bigarrade is planted and on this stock the desired variety is planted. It has proved a good healthy stock."

Messina, Sicily. "The bitter orange stock is of universal use since 1870, when groves of trees perished wholesale by *la gomma*. These were such as were grafted on sweet orange and lemon."

Palermo. "The trees are exclusively raised by grafting or budding upon *aranci amari*, the bitter bigarrade stocks. Even the lemons are grafted on these stocks and are more healthy than those on their own roots."

Valencia, Spain. "Till the general spread of disease a few, years ago, propagation was effected by grafting the orange on the lemon stock. They now use the *bigarrado Franco*. These latter, the bitter orange, always give more vigorous, luxuriant, longer-lifed trees which resist cold better than any other."

Compare also Van Deman, U.S. Experimental Station Report II., 749-750; N.S.W. Agric. Gazette III. (1892), p. 129; Victorian Commission Reports VI., p. 20, among a host of other testimonies.

In the Eastern Province it is matter of common knowledge that the finest mature orange trees are those on the bitter stock. But then the men owning these trees had the good sense to forego the fruiting of the first few seasons, removing the premature crop at an early stage, so as to concentrate the trees' vitality upon their vegetable system and postpone the exhaustion of the reproductive process. I hold the opinion that the greater part, if not all, the complaints of the bigarrade stock arise from the greedy haste to get a crop off the tree instead of letting it come to maturity before fruiting. Exhaustion follows as a matter of course, and dissatisfaction ensues.

P. MacOwan.

2nd March, 1901.

Apples and Pears on Dwarf Stocks.

A contributor to the *Field* writes :—

"As regards the superior advantages claimed for dwarf stocks—what are they? Their introduction came about in this way among gardeners—for, practically, owners of orchards have troubled their heads but little about them. Owing to the way apple and pear trees on the natural stock have been pruned and trained in the past, by cutting and hewing in a way that produced a thicket of wood instead of fruit, and did not tax the roots to their full capacity, cultivators had to wait years longer than was necessary till the trees came into bearing. It was commonly supposed that the man who planted apple trees planted for his old age or for his children, so remote was the fruiting stage of trees regarded. This led to the introduction of dwarf stocks. The theory was put forward that the paradise stock for the apple and the quince for the pear would give us crops of fruit years sooner than was possible on the old stock under any form of culture, but it was soon found that by the elaborate system of training small trees set up it took years to produce a tree of bearing size, and that a far greater number of trees was required to stock a garden than when trees on the natural stock were used. This delay was, however, caused by the method of culture adopted. Ostensibly, dwarf stocks were employed to restrict the vigour of the stronger apple and pear and induce fertility. They would have accomplished the first object if cultivators had let their stocks alone and allowed the trees to grow and tax the stock to its utmost; but that was not done. The inevitable pruning was still deemed necessary, which reduced the value of the stock as a restrictive agent intended to do away with root pruning altogether, and it actually came to pass that the greatest advocates of dwarfing stocks were soon found root pruning harder than ever in the orchard house and out of doors, and one has only to read their manuals on the subject to see that restricting the restrictive stock had become as great a necessity as it had ever been in the case of the natural stock. And now, as to the actual effects produced on the apple and pear by the dwarf as compared with the natural stock. In the first place, there is nothing whatever in the quality of the fruit of the quince or of the paradise to lead one to suppose that either could improve the flavour and general quality of the fruit of the pear or apple, but the contrary, although it has been often claimed that both the size and flavour of the fruit were improved thereby. Large and good flavoured fruits have been got from dwarf trees, but the quality, if not due to culture and protection, has never been proved to result from the stock. In the second place, I venture to state what may surprise some, viz., that under equal conditions of soil and climate fruit is not produced one whit earlier on the dwarf stock than it is on the natural stock, and that, tree for tree, the natural stock produces by far the more abundant crops in the same time. What happens is

this. Planted under equal conditions of soil and exposure, trees on the natural stock run out into shoots of length and vigour in proportion to the stock, and if their shoots are not too severely pruned they form fruit-buds the second year at the latest, which buds produce fruit the third year. The most precocious stock cannot do more than that, and the natural stock does it as readily as any other. Tax the two trees in proportion to their roots and you get just the same result, viz., crops in the same time equal in all respects. These statements may be questioned, but let me give examples.

It should be understood, first, that a healthy crab or dwarf paradise, under equal conditions, produces just as much growth in branches as they are able to mature annually. The crab stock produces stronger and longer shoots than does the paradise, but the tree that makes the most growth produces the most abundant crop of fruit, and the older the trees get the greater the difference becomes. For example, supposing that we buy from the nursery an apple tree on the crab stock with a two or three-year-old head of branches that has not been cut back, but perhaps only pinched at their extremities, and plant the tree carefully in October, it may bear fruit the following year. I have seen this happen often, and I have seen standards of free-bearing apples like the Ecclinville and Lord Suffield bear a crop the second year after planting that by their number and weight weighed down the branches. Lately a photo of an apple tree on a stock about 4ft. high that produced eight bushels of fruit last year, although the tree was only eleven years of age, was published in a contemporary. Can examples like these be beaten by the dwarf stock, or have they ever been equalled? The dwarf stock, with its equally dwarf top, formed by continual cutting back, is such a farce, as an example of precocity, that one wonders the absurdity of such things has not been long since realised. Years ago I saw a large stock of dwarf apples and pears that had been sent to stock a garden and orchard house. They had been trained as pyramids, and there was not a tree in the lot, I should say, that was less than seven years of age, the trees having had to be kept down to keep their bottoms furnished. They were supposed just to be established for going on, but it would be years after that before the owner could expect even small crops. And that is the way the precocious dwarf stock has been utilised by its advocates. Dwarfs are dying out, but at one time you might have seen hundreds of such trees in nurseries, prepared for sale, that years had been spent upon in simply getting into shape. Latterly it has been insisted that the dwarf tree system provides recreation for amateurs and others in pruning and pinching their own trees. If that satisfies some, and crops are of little or no consequence, nobody need find fault, but if the collections that one often sees in the gardens of such people are a sample, the owners would be about as well employed in pinching the hedgerows by the roadside. I am within the mark when I state that, so far as amateurs and the like are concerned, for whom dwarf stocks and trees were chiefly intended, the dwarf tree system has been a failure, while in most

private gardens it is not much better. I admit that in soils where the roots can get down deep into the subsoil the natural stock is at a disadvantage, but wherever the soil has a dry bottom and is not too deep the trees begin to bear just as soon as they do on the most precocious stock, while in deep soils the balance can be more than met by occasional root pruning.

As regards the plea that dwarf stocks take up little room, and that the trees never get very high and do not suffer from winds, that is only half true, and besides, there is no need for trees on the natural stock being very tall. It is found that trees on the crab and pear stock, when grafted near the ground, need never be so high that a man cannot gather the fruit from the highest branches without a ladder. There are hundreds of gardens where all the trees round the kitchen garden plots are like this, and there are now plenty of natural bush trees on both kinds of stock of the same size, but not trained in an artificial manner."

Return of Fruit Exported

DURING THE MONTH OF JANUARY, 1901.

PORT.	VARIETY OF FRUIT.	NO. OF PACKAGES.	QUANTITY.	DECLARED VALUE. £	s.	d.
Cape Town ...	Apricots ...	407	11,000	110	0	0
	Peaches ...	2,386	67,006	577	11	0
	Plums ...	1,077	36,291	167	1	0
	Nectarines ...	136	3,746	16	6	0
	Pine Apples ...	26	1,600	19	10	0
	Totals ...	4,032	119,643	£890	8	0

Fruit and Honey in Queensland.

Queensland, Australia, has a population of about half a million. The country has an immense capacity for fruit production, the past year's output comprising 435,620,820 bananas, 4,820,316 pineapples, 17,045,268 oranges, and 2,292,888 mangoes. In addition, there were 80,000 bushels of Cape gooseberries, 57,432 cocoanuts, 331,800

lemons, and 17,156lb. of peanuts. In various parts of the colony strawberries, pears, apricots, peaches, guavas, limes, persimmons, and passion fruit are successfully grown. Queenstown is also a fine country for bees, as nearly all the forest trees flower and provide large supplies of honey and pollen, whilst the winters are so mild that the bees are not compelled to remain in the hives and consume their own stores, as in colder climates. The quantity of honey which the colony can produce when the industry is shown to be profitable is almost unlimited.—*Fruit-grower.*

MISCELLANEOUS.

Locust Destruction.

In connection with the Government Scheme for the destruction of locusts, detailed on pages 684/686 of the *Agricultural Journal* of the 22nd November last (vol. xvii. No. 11), the accompanying letter from the Resident Magistrate of Elliotdale, forwarding a report by Mr. Soga, and statements of two men engaged in the destruction of locusts, giving the results obtained by the use of fungus and soap and water, is published for general information:—

REPORT ON DESTRUCTION OF LOCUSTS, ELLIOTDALE.

SIR,—I have the honour to forward for your information copy of a letter dated 4th instant, from Mr. Soga, also statements made by the two men engaged in the destruction of locusts, as to the results obtained by fungus and soap and water.

The whole of the coast line appears to be swarming with young locusts and every effort is being made to destroy them.

It will be seen that the work has been successful, but as the area of operation is large, the two men have not been able to complete their task; and I have this morning applied for an extension of the period of their employment for another month.

I have, etc.,

W. T. HARGREAVES,
Resident Magistrate.

Elliotdale, 6th March, 1901.

ANNEXURE 1.

LETTER FROM MR. W. A. SOGA TO RESIDENT MAGISTRATE, ELLIOTDALE.

SIR,—I have the honour to report that all the tubes of locust fungus supplied to me by you I have distributed among headmen

and others, as we fortunately have no locusts in this upper part of the district. Along the coast there are numerous swarms of young locusts. From repeated enquiries among those to whom I distributed the fungus I learn that a number of large swarms of young locusts have been destroyed. The Bomvanas are quite satisfied with the success of the fungus in their district. As they depend largely upon their grain it would be a remarkable fact if they were satisfied without some reasonable grounds. They are constantly asking for fresh locust fungus tubes.

I was anxious to know their opinion of locust fungus *versus* soap and water. The latter has been largely used through the influence of the traders, but the consensus of opinion in the district both among traders and Bomvanas is that soap and water is a failure.

The Bomvanas say they believe in the fungus and the fungus they want; in former years they have been able to reap their fields and live, they say, by its means. As Ngaba, one of their chief men, said, "Siyakolwa tina letiyeza lenkumbi kuba sitya ngalo."

In all I have distributed 44 tubes, among others to the following: Gwebindlala (at the Great Place), Zwelibanzi (Holieni), Zono (Manzanyela), Gaqelo (Xora Mouth), and Mr. Lawlor, Madwaleni.

The weather recently has been favourable for the growth of the fungus; it has been wet and misty.

In some cases the Bomvanas are gathering up the dead young locusts and grinding them up and using them to re-infect the living.

I observe one swarm at the Qatywa of young locusts under the influence of the fungus in the process of dying off. Fresh tubes are needed and the people are daily asking for them. If you could induce the Government to send a fresh consignment the Bomvanas would esteem it a great favour.

WM. A. SOGA.

Miller, Elliotdale,
4th March, 1901.

ANNEXURE 2.

REPORT ON DESTRUCTION OF LOCUSTS BY AYLIFF.

Soap Spraying.—From the 7th February, 1901, I sprayed with soap suds, using bushes as sprayers, in many parts of the district, until the 23rd, when I was supplied with a Government Spray Pump. When using bushes as sprayers I met with only moderate success killing locusts, as they always hide themselves in the long grass and thus escape being touched by the suds. I met with more success when using the pump, as I was then able to put great force on the grass and reach those locusts that were hiding. I used the pump along the Gqatyana, Xora, Bafazi, Fumba, Ntlansana, Zangqolwana and Mncwaza streams. I destroyed many locusts, but those not touched by the soap suds always escape and there are still a few in

the above localities. I have experienced great trouble in inducing the natives to supply me with soap and have been obliged to buy it privately myself.

Fungus.—The headmen to whom fungus was issued on the 5th February, 1901, were not very successful in destroying locusts, but I found that they are slowly dying in Joyi Tyali's location and in several of the other locations. It is evident that they did not know very well how to use it or were very careless with it. From the 26th Feb. to date I infected many swarms of locusts along the Mncwaza, Ncoko, Ncetyana, Bumbana, Mdikana and other streams, and I find that they are contracting the disease. On the 22nd idem I infected a swarm in Mtutu's location and on returning fonnd that they were dying in great numbers.

Report by Ncanywa.

Soap.—From the 7th February to the 23rd idem, when I was served out with a Government Spray Pump, I sprayed locusts in different parts of the districts with soap suds, using bushes as sprayers. As locusts always hide themselves in the long grass when being sprayed I was only able to destroy a small number. From the 23rd idem I was more successful with the pump and was able to destroy a great many along the Bashee and Mgazana. I also have experienced great difficulty in obtaining soap from the natives.

Fungus.—Only a few of the headmen supplied with fungus on the 5th February, 1901, seemed to be able to prepare it properly, and consequently were not very successful with it. Headman Ncapayi handed me some fungus and I infected some swarms of locusts in a small portion of his location, and I find that I have destroyed the infected swarms. From the 1st idem I infected many swarms along the Bashee and Magazana Rivers, and on inspecting a few days ago I find that they are dying and diseased in those parts. I have used the fungus in many parts and hope to be successful in killing many swarms.

Willows or Osiers.

In continuation of the article on the cultivation of osiers in No. 1, page 31, of this volume, the following account is taken from the *Field*:—

"No minor branch of forestry is better worth attention and careful experiments than the culture and utilisation of willows and osiers on land that is either derelict or totally unfitted for the growth of other shrubs and trees. Volumes have been written on the subject, and local government boards and private proprietors have done their best in some few cases to foster the osier industry, and still we have thousands of acres of suitable land lying idle, and import a large

proportion of our supply of osier "rods" from Belgium and Holland or from France. We may say that nearly all the best and finest kinds of wicker work are made in England and in Ireland from imported rods, just as our linen is now largely manufactured, even in Belfast and in Scotland, from imported flax. That France and the Low Countries should have gained almost a monopoly of the trade in osiers and flax is a question worth the careful attention of all who are interested in land cultivation and in technical education. One advantage possessed by willows and osiers is their rapid growth when once well planted in suitable situations, hence the planter has not so long to wait for returns as in other branches of forestry or tree culture; and besides this, as we have already said, osiers may be profitably grown on land not so well adapted for any other crop, which is a special advantage. Low-lying breadths of land near to rivers, lakes and streams, which may now and then be submerged even, are suitable, or may be readily made suitable, for the growth of osier rods or willow timber. Again, whenever river banks are liable to be loosened or washed away, willows may be planted with the dual advantage of ornament and of usefulness, since their roots tie and bind the banks, and so prevent floods or a sudden rush of water from doing harm.

The late Mr. Scaling, a great practical authority, who had some osier holts at Basford, near Nottingham, used to say that the best osiers were grown beside the Trent in that county; others, again, aver that the best and toughest rods come from Huntingdon or Cambridgeshire, the vicinity of Ely having long been a noted spot for good osier crops, as it used to be for reeds when thatching was something of a fine art in the Fen country. We are not so sure that good osiers prefer the soil too wet, but they often thrive well in spite of moisture, provided it flows away freely and is not stagnant. Any low-lying dry waste land that can be cut into beds, with irrigation channels between them, may be utilised, as also may sewage farms or plots even near large towns. In Essex osiers have been profitably grown on sewage plots, and there is some public competition for rods so grown, which is no bad testimony as to their quality. In any case the land must be deeply cultivated or trenched, and only the very best kinds of osiers should be planted, and of these the yellow or Belgian osier is one of the best of kinds to grow.

The Wire Hornrod is another tough and popular kind, but almost every willow-growing district has its own varieties of *Salix viminalis*, or osier, and its local names for those most esteemed. There are apple osiers, velvet-topped, snakebark, speckled or brindled, cardinal or red, American, whipcord, and many others, which in size and quality or toughness best suit the various styles of wicker-work goods and their makers. Some of the best "holts" or osier beds are on land subject to tidal overflow of rivers such as the Thames, the Trent, and many others all over England and Ireland.

There are many practical details connected with the growth, harvesting and utilisation of the osier crop, that must be learned and

attended to in order to ensure success. Good "sets" or cuttings of the best kinds must be properly planted at the right time and in suitable situations. Then the crop must be cut and tied up into "bolts" or bundles of a certain size, each containing only one particular kind of rod. When cut and bolted, rods keep good for months, or even up to two years, under proper management. A "bolt" is a bundle of rods, 42in. in circumference at 6in. from the base, as tightly pressed into shape by a stout and simple lever press. In 1894 bunching rods fetched 3s. to 5s. per bolt, free as loaded on the railway. Added to rent of land and cost of initial preparation, say at the least £15 to £25 per acre, there is the cost of the best sets. An acre requires 20,000 cuttings, at 10s. to 15s. per thousand, to which cost of planting them must be added, of course, and, if everything turns out successfully, all costs will be repaid in three or four years. Six or eight tons of rods is the average yield of an acre of good osier land. Sometimes, as at Thame in Oxfordshire, some of the osiers are left uncut for five to seven years, and then used for special purposes, such as thatching or hurdle making, &c. On the other hand, for fine wicker and fancy basket work, small sets or cuttings, with one or two eyes only, are planted very thickly, so as to produce a crop of fine weak shoots close together like corn. These are cut every year, and very carefully sorted by experts, for the finest work only, *Salix forbyana* or *S. vitellina* being the sorts most generally preferred. Osiers for coarse work, such as brown hampers, flats, and rough baskets, are stacked in such a way as not to become heated. Those for white work must of course be stripped or peeled, after being stored or kept some time. They are sorted and tied into bolts or bundles, and then the butt ends of the bolts are placed in four or five inches of water, where they root and bud in spring, and are then easily peeled by a simple contrivance called a "break," through which each rod is deftly pulled.

Intending planters may see an exhaustive article by Mr. Baillie in the *Journal* of the Royal Agricultural Society of England, and another is in the *Encyclopædia Britannica*. There is also an article in *Chambers's Encyclopædia*, and an interesting chapter in Ablett's *English Trees and Tree Planting*, p. 370. A handy little penny pamphlet on osiers by Mr. W. W. Glenny was published in 1895 by the Society for the Propagation of Christian Knowledge, Northumberland-avenue, W.C. A secondhand copy of an important pamphlet by the late celebrated osier specialist, Mr. Scaling, of Basford, near Nottingham, may now and then be obtained, which is full of reliable information as to the state of the osier industry prior to 1871, when about 7,000 acres were believed to be under osier culture, not including willow spinnies and plantations annexed to farms for local use or consumption."

Following on this, a correspondent wrote:—

"I am much interested in the article in the *Field* [on 'Willows or Osiers.' Between thirty and forty years ago they paid well, running up to as high as £19 per acre, whilst £10, £11 and £12

were not uncommon prices. In 1878 £10 was the highest, and since that date the price has steadily declined, until, at the present time, they are almost unsaleable. The reason given me by the dealers in rods is that they can buy foreign rods delivered in England at about the same price as they have to give for them here standing. I may say that they are an expensive crop to cultivate, requiring two or three hoeings, besides the clearing of the ground, trenching and replanting, say, every ten years, and that, in consequence of the low prices, I have not spent the same money on clearing, merely cutting out the rubbish with a hook instead of hoeing, as I used to do."

To which the Editor added:—

"One reason why home-grown osiers became neglected was the cost and trouble of harvesting the crop that purchasers often had to pay for in England; whereas, imported osiers were of uniform quality, ready bunched and prepared, and the supply was regular, and their quality to be depended upon. A good many are still grown at a profit in this country."

Horse-sickness in South Africa.

Communicated by M. NOCARD to the Central Veterinary Medical Society, Paris. (*Veterinary Record*, Feb. 16th, 1901.)

After referring to the general character of the disease, its two principal forms, its symptoms, the fact that it can be reproduced by inoculation but is neither infectious nor directly contagious, M. Nocard then describes the manner in which the disease is usually contracted, viz. "by exposure to the night air," and adds, "that this fact appears to point to some connection between horse-sickness in equines and paludism (malaria) in man. After referring to the well-ascertained fact that malarial fever in man is communicated and propagated by the bites of *Anopheles*—(a variety of mosquito)—he adds, "it appears possible that horse-sickness may be caused, like malaria, by the bite of some nocturnal insect, but what insect is as unknown as what is the actual virulent agent of the disease. All that we can say is that the blood of the affected animals is virulent, and that inoculation with even a small quantity of such blood will reproduce an attack of illness that is generally fatal, with symptoms and lesions the same as those seen when it is acquired naturally."

Further, from two inoculation experiments which he made with blood obtained, in the one case 5 months previously in the Transvaal by MM. Danysz and Bordet, and in the second case with blood obtained from the first case after being kept 27 months, he ascertained that the "blood retains its virulency for a long time, in fact we may say indefinitely. The pericardial serum and the exudation from the mucous membrane of the bronchi and cellulur tissue are also

virulent, but according to Edington in a lesser degree than the blood."

"All efforts to discover the agent of this intense and durable virulence have up to the present been unsuccessful. The two cases mentioned were the subjects of careful observations, but without any result. The blood at various stages of the attack was carefully examined both fresh and stained in many ways, but no alteration in its morphological elements was ever noticed, neither could any microbe or parasite ever be detected even with the highest powers. Furthermore, all my culture experiments have been failures, although I have had recourse to every known method. The microbe is no doubt so small as to be invisible even under the highest powers, and the following experiments which I conducted appear to show that, like those of foot and mouth disease and pleuro-pneumonia, it will pass through a porcelain filter." After describing these experiments in detail M. Nocard adds:—"It is well known that the microbe of foot and mouth disease will pass through, not only Berkfeld, but Chamberland and Kitasato filters. That of pleuro-pneumonia—(lung-sickness)—will pass through a Berkfeld and Chamberland F bougie, but not a B bougie or Kitasato filter. The organism of horse-sickness will pass through the Berkfeld filter but no other. It is therefore reasonable to conclude that it must be larger or more adhesive than those of foot-and-mouth disease or pleuro-pneumonia."

"Up to the present all attempts at treating horse-sickness have been failures, but recently Dr. Edington has published some facts that lead us to hope that a solution of the problem may be arrived at."

D.H.

CORRESPONDENCE.

Warts on Poultry.

For the last three years I have used bluestone or copper sulphate on the beaks of young turkeys and chickens, with success. I now recommend this remedy to all farmers who keep this sort of poultry. I know personally that in our district this pest is very bad. I have lost about 80 small turkeys from warts, but now in the last three years I have not lost a single one.

How to use the remedy:—Pound the bluestone fine, and open the wart with a needle so that it bleeds. Sprinkle or rub the bluestone on it every two days or as often as you think it necessary. Sometimes the wart drops off with the first rubbing.

L. F. SNYDERS.

The remedy proposed in *Agricultural Journal*, vol. xiii. No. 13, appears to offer greater facility in the treatment, and its efficacy is undoubted.

Mr. Snyders might try the relative merits of iodine as compared with bluestone.—EDITOR.

Rust-resistent Oats.

The importance of securing a few varieties of really rust-resistent oats is so vital to all South African farmers, more especially to the coast districts, that no apology is needed by the Agricultural Department anent "interfering with the business of importers." Feeling this last season, on account of the action of the Department in the destruction of locusts, I thought I would risk a few bags of seed; more especially as an importer, after a trip home, had come back with a pedigree oat, guaranteed to him to be rust-resisting, by name "Abundance," weighing 57 lb. to the bushel, certainly the finest oat I had ever seen. Result was, grand promise up to piping; after that, total destruction by rust. It stooled again but with the same result. My neighbour had the same experience, having tried the same variety, also two other varieties of local origin, absolutely killed by rust, but one land (contiguous) of Egyptian oats not only had no sign of rust but stooled magnificently, and I never saw a prettier field of oats in South Africa or at home, short in the straw, good head, and typical oathay. I also learn equally good results have accrued wherever tried. I shall be pleased to assist you in giving a trial to any of the varieties named.

W. GOULDEN.

East London, March 14th.

This Department has no Egyptian Seed Oats in stock, but attention is invited to the Notice which appears below, offering small lots of River Plate Oats and Texas Rust-resisting Oats for trial sowing at cost price.

EDITOR.

Show Fixtures.

Indwe Native Agricultural Society, March 1901.
Oudtshoorn Fruit Growers' Association, 6th March, 1901.
Wodehouse Agricultural Society, March 1901.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows:—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town, will be received up to the 31st March, 1901.

Surplus Seedlings.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 8th March 1901:—

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Distribution of American Vine Cuttings—Season 1901.

The following Government Notice was published in the *Government Gazette* of the 12th February, 1901:—

It is hereby notified for general information that the following are the arrangements made for the distribution of the American Vine Cuttings from the Government Plantations during the Season 1901.

1. All applications must be in writing upon printed forms obtainable from the Civil Commissioner and Field-cornets of the Division, and must be addressed to the local Board of Distribution for the District concerned.

2. Applications must be sent in to the Local Boards (addressed to the care of the Civil Commissioner) not later than the 18th of March, after which date no application can be received.

3. The Local Boards will thereupon allot the Cuttings according to the number estimated to be available, notifying the applicants in due course. Allottees must pay for the Cuttings allotted to them not later than the 18th of May, after which date all Cuttings not paid for shall be considered as not wanted, and shall be forfeited and held to be available for allotment to some other person.

4 The Distribution of Cuttings will commence as soon as possible after the 1st of June. Allottees will receive their Cuttings direct from the Nurseries, and will be advised by post of the dispatch of the same.

5. The Cuttings will be divided into two classes, according to thickness. Cuttings not less than 3-16ths of an inch in thickness and 12 inches long will be charged for at the rate of 10s. per 1,000. Cuttings less than 3-16ths of an inch in diameter will be charged for at the rate of 5s. per 1,000; the apportionment to be left in the hands of the Distributing Officer. All Cuttings will where practicable be delivered in double length.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Insti-

tute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....

Owner's name and address } ....

In charge of..

Place to which Cattle are being sent..............................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..

(Address)..

Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of...
Place to which Cattle are being sent.......................
(Inspector's signature).......................................
(Address).......................................
Date....................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce
   (*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.
   (*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Feeding Stuffs and Manures

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		5 6 0	to	5 10 0
English linseed cake	ex mill	8 7 6	,,	8 10 0
American Western linseed cake	ex quay	7 7 6	,,	7 12 6
Russian oil cake	,,	7 10 0	,,	7 15 0
Feeding cake, Samuelson's S.P.F. (10 to 12 per cent. oil)	ex warehouse	6 7 6		—
Decorticated cotton cake	ex quay	6 10 6	,,	6 17 6
Decorticated cotton meal	,,	6 5 0		—
London made cotton cake (best)	ex mill	4 18 9	,,	5 0 0
Egyptian cotton cake (in bags)	ex quay	4 15 0	,,	4 16 0
Burton desiccated ale grains (bags included)	on rail, Burton	4 12 6		—
Rangoon rice meal	ex warehouse	4 7 6		—
Russian linseed in bulk, per 416 lb.	,,	2 11 0	,,	2 17 0
Calcutta linseed in bags, per 410 lb.	,,	2 14 0		—
Locust beans, per ton		5 12 0		—
MANURES, per ton 2,240 lb.				
Nitrate of soda		8 7 0	,,	8 10 0
Bone meal		3 15 0		—
Kainit		2 7 6	,,	2 10 0
Basic slag, 35°		1 17 6		—
Superphosphate, 36 per cent.		3 3 0		—

Mark Lane Express, Feb. 18th, 1901.

AMERICAN PRICES per ton of 2,000 lb.

	£ s. d.
Bran, per ton	3 19 2
Linseed cake, per ton	5 15 0
Cottonseed cake meal, per ton	5 6 10
Mealies, per bushel 60 lb.	0 1 11
,, per muid 200 lb.	0 6 8
Barley, per bushel 50 lb.	0 2 3
MANURES—	
Ground bones, per ton 2,000 lb	4 11 0
Kainit, best quality ,,	1 19 0
Nitrate of soda	8 0 0
Florida High Grade Phosphate Rock	2 0 0

New York Journal of Commerce, Feb. 11th, 1901.

RAINFALL, FEBRUARY, 1901.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

Station	Inches
I. CAPE PENINSULA:	
Royal Observatory (*a*) 12 inch gauge	0·64
Do. (*b*) 8 inch gauge	
Do. (*c*) 8 inch gauge on roof	
Cape Town, Town House	0·53
Do. South African College	0·55
Do. Sea Point Hall	0·63
Do. Molteno Reservoir	0·77
Do. Platteklip	1·55
Do. Signal Hill	0·65
Table Mountain, Disa Head	
Do. Kasteel's Poort	2·69
Do. Waai Kopje	2·68
Do. St. Michael's	4·06
Devil's Peak, Block House	1·75
Do. Nursery Gauge	n.r.
Do. Lower Gauge	n.r.
Rondebosch	1·16
Newlands (Montebello)	n.r.
Bishop's Court	2·13
Claremont (Sanatorium)	1·37
Kenilworth	1·75
Do. (St. Mary's)	1·54
Groot Constantia	1·94
Tokai	1·39
Simon's Town (Wood)	1·36
Do. (Gaol)	1·42
Blaauwberg Strand	0·36
Robben Island	n.r.
Strandfontein	n.r.
Camp's Bay	0·92
II. SOUTH-WEST:	
Eerste River	1·08
Klapmuts	0·97
Stellenbosch (Gaol)	1·06
Somerset West	0·92
Paarl	0·97
Wellington (Gaol)	1·52
Do. (Huguenot Seminary)	1·42
Tulbagh	1·52
Kluitjes Kraal	n.r.
Ceres	1·63
Rocklands	0·73
Caledon	1·83
Worcester (Gaol)	0·67
Do. (Meiring)	0·49
Do. (Station)	0·76
Hex River	n.r.
Lady Grey (Div. Robertson)	1·37
Robertson	2·67
Do. (Govt. Plantation)	2·37
Montagu	3·16
De Hoop (Div. Robertson)	n.r.
II. SOUTH-WEST—*continued.*	
Ceres Road	1·13
De Doorns	0·66
Triangle	1·81
III. WEST COAST:	
Port Nolloth	0·00
Do. (Howard)	n.r.
Klipfontein	0·04
Kraaifontein	0·00
O'okiep	0·05
Springbokfontein (Gaol)	0·24
Concordia	0·09
Garies	n.r.
Kersefontein	n.r.
The Towers	1·21
Dassen Island	n.r.
Malmesbury	1·59
Piquetberg	1·98
Van Rhynsdorp	0·12
Clanwilliam (Gaol)	0·18
Do. (Seydell)	0·19
Welbedacht	0·05
Hopefield	0·82
Lilyfontein	0·50
Piquetberg Road	1·35
IV. SOUTH COAST:	
Cape L'Agulhas	0·96
Bredasdorp	3·91
Swellendam	6·61
Heidelberg	6·44
Riversdale	3·86
Herbertsdale	n.r.
Geelbeks Vlei	6·99
Mossel Bay	4·76
George	9·56
Ezelzagt	n.r.
Millwood	n.r.
Sour Flats	n.r.
Concordia	n.r.
Knysna	6·10
Buffels Nek	n.r.
Harkerville	n.r.
Plettenberg Bay	3·80
Forest Hall	n.r.
Blaauwkrantz	6·90
Storm's River	4·90
Witte Els Bosch	4·33
Humansdorp	3·19
Cape St. Francis	1·28
Hankey	2·28
Witteklip	n.r.
Van Staadens (upper)	n.r.
Do. (lower)	3·61

IV. SOUTH COAST:—*continued.*	INCHES.
Uitenhage	2·30
Do. (Inggs)	2·45
Dunbrody	2·11
Port Elizabeth (Harbour)	1·03
Walmer Heights (near Port Elizabeth)	3·12
Tankatara	1·94
Lottering	n.r.
Shark's River (Nursery)	n.r.
Do (Convict Station)	1·36

V. SOUTHERN KARROO:	
Triangle	1·81
Touws River	0·94
Do. Station	0·90
Ladismith	2·73
Amalienstein	5·61
Calitzdorp	4·29
Oudtshoorn	2·36
Vlakte Plaats	n.r.
Uniondale	2·09
Kleinpoort	n.r.
Glenconnor	2·40
Verkeerde Vlei	1·17
Brak Vlei	2·22
Pietermeintjes	0·60
Laingsburg	0·67
Grootfontein	1·36

VI. WEST CENTRAL KARROO:	
Matjesfontein	n.r.
Prince Albert Road	n.r.
Fraserburg Road	2·04
Prince Albert	1·41
Zwartberg Pass	3·70
Beaufort West	1·92
Dunedin	0·75
Nel's Poort	2·36
Camfer's Kraal	2·99
Lower Nel's Poort	2·53
Baaken's Rug	3·45
Willowmore	1·60
Steytlerville	3·00
Roosplaats	1·08

VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	3·43
Do. (Bedford)	3·78
Aberdeen Road	n.r.
Rietfontein	1·41
Winterhoek	3·09
Klipdrift, De Erf	n.r.
Kendrew	1·99
Graaff-Reinet	2·57
Do. (College)	2·57
New Bethesda	3·61
Roode Bloem	3·24
Wellwood	n.r.
Do. Mountain	n.r.
Jansenville	n.r.
Patrysfontein	3·25
Toegedacht	3·04
Klipfontein	2·22
Cranemere	3·01

VII. E. C. KARROO:—*continued.*	INCHES.
Pearston	3·85
Somerset East	6·77
Do. (College)	7·36
Longhope	6·42
Middleton	n.r.
Corndale (Div. of Aberdeen)	n.r.
Cookhouse	2·64
Doornbosch, Zwagershoek	n.r.
Middlewater	1·73
Darlington	1·40

VIII. NORTHERN KARROO:	
Calvinia	n.r.
Middelpost	0·44
Sutherlanp	1·39
Rheboksfontein	n.r.
Fraserburg	1·00
Onderste Doorns	n.r.
Droogefontein	4·26
Gannapan	1·24
Carnarvon	4·58
Wagenaar's Kraal	2·73
Brakfontein	n.r.
Vogelstruisfontein	1·70
Victoria West	4·67
Britstown	4·58
Murraysburg	n.r.
De Kruis	n.r.
Richmond	7·64
De Aar	5·57
Middlemont	3·89
Hanover	3·79
Philip's Town	4·40
Boschfontein	5·04
Petrusville	n.r.
The Willows	n.r.
Naauwpoort	4·26
Middelburg	2·70
Colesberg	6·13
Tafelberg Hall	4·15
Rietbult (Colesberg Bridge)	n.r.
Stonehills	2·40
Cradock	3·66
Do. (Rose)	3·55
Varsch Vlei	4·97
Witmoss	3·45
Steynsburg	4·54
Steynsburg (Nesemann)	n.r.
Daggaboer's Nek	4·06
Quagga's Kerk	n.r.
Tarkastad	4·83
Drummond Park	4·29
Riet Vlei	n.r.
Brand Vlei	n.r.
Omdraai's Vlei	3·50
Zwagersfontein	3·16
Varken's Kop	5·46
Culmstock	3·91
Doorskuilen	3·03
Houwater Dam	n.r.
Hillmoor	6·42
Glen Roy	5·14
Fish River	n.r.

VIII. N. KARROO—*continued.*	INCHES.
Spitzkop	n.r.
Phizantefontein	2·06
Biesjesdam	n.r.
Kleinhaasfontein	4·91
IX. NORTHERN BORDER:	
Pella	0·00
Kenhardt	0·39
Van Wyk's Vlei	2·89
Prieska	2·80
Dunmurry	2·39
Griqua Town	3·10
Campbell	4·15
Douglas	7·68
Avoca (Herbert)	4·71
Eskdale	3·12
Hope Town	3·98
Orange River	n.r.
Newlands (Div. Barkly West)	4·11
Groot Boetsap	n.r.
Kimberley (Gaol)	3·22
Do. (Stephens)	3·30
Bellsbank (Div. Barkly West)	2·83
Grootdrink	n.r.
Barkly West	2·48
Upington	1·56
Trooilapspan	0·94
X. SOUTH-EAST:	
Fairholt	4·45
Cheviot Fells (Bedford)	n r.
Alicedale	n.r.
Bedford (Gaol)	4·17
Do. (Hall)	n.r.
Sydney's Hope	2·15
Cullendale	n.r.
Adelaide	3·60
Atherstone	n.r.
Alexandria	1 88
Salem	2·64
Graham's Town (Gaol)	3·64
Do. (Bact. Inst.)	3·21
Heatherton Towers (near Graham's Town)	n.r.
Fort Beaufort	4·03
Katberg	7·49
Balfour	7·26
Seymour	4·34
Glencairn	5·23
Alice	n.r.
Lovedale	0·00
Port Alfred	1·47
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	3·02
Cathcart	7·06
Keiskama Hoek	4 20
Dynamite	5·42
Thomas River	3·65
King William's Town	4·02
Do. Hospital	4·35
Stutterheim (Wylde)	5·04
Do. (Beste)	4·65
Dohne	6·47

X. SOUTH-EAST:—*continued.*	INCHES.
Kubusie	5·91
Blaney	n.r.
Kei Road	5·34
Berlin	4·88
Isidenge	n.r.
Pirie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	3·09
Komgha	4·58
Prospect Farm (Div. Komgha)	n.r.
East London, West	3·49
East London, East	3·93
Fountain Head	5·77
Fort Cunynghame	n.r.
Katberg Sanatorium	n.r.
Cuylerville	n.r.
Bolo	n.r.
Fort Fordyce	n.r.
XI. NORTH-EAST:	
Venterstad	5·05
Ellesmere	9·25
Burnley, Cyphergat	n.r.
Burghersdorp	5·80
Burghersdorp (Le Roex)	5·80
Molteno Station	n.r.
Cyphergat	6·00
Thibet Park	6·12
Sterkstroom	4·72
Sterkstroom (Giddy)	n.r.
Rocklands	5·03
Aliwal North (Gaol)	3·78
Aliwal North (Brown)	4·51
Rietfontein	5·00
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	5·69
Jamestown	4·47
Queenstown (Gaol)	7·40
Queenstown (Beswick)	8 32
Dordrecht	4·15
Tylden	5·74
Snow Hill	1·75
Herschel	3·84
Lady Grey	6·27
Bolotwa, Contest	5·82
Lady Frere	5·54
Avoca (Div. Barkly East)	n.r.
Keilands	4·32
Barkly East	3·94
Glenlyon	4·93
Gateshead	4·51
Lyndene	n.r.
Mooifontein	6·70
Poplar Grove	4·90
Biesjesfontein	n.r.
Whittlesea	3·86
XII. KAFFRARIA:	
Slaate, Xalanga	6·43
Ida, Xalanga	5·47
Cala, Xalanga	4·80
Cofimvaba	n.r.

XII. KAFFRARIA—*continued.*	INCHES.
Nqamakwe	6·63
Main	3·51
Engcobo	6·04
Butterworth	3·14
Kentani	1·72
Maclear	4·36
Idutywa	3·03
Willowvale	4·06
Mount Fletcher	5·20
Elliotdale	1·56
Mqanduli	2·54
Matatiele	n.r.
Umtata	3·18
Qumbu	4·42
Kokstad	3·41
Port St. John's	n.r.
Umzimkulu	2·40
Woodcliff	n.r.
Tabankulu	3·01
Kilrush	8·78
Somerville (Div. Tsolo)	4·26
Tsomo	2·66
XIII. BASUTOLAND:	
Mafeteng	n.r.
Mohalie's Hoek	4·04
Qacha's Nek	3·27
Moyeni Quthing	3·95
Teyateyaneng	5·74
Leribe	n.r.
Butha Buthe	n.r.
Maseru	5·71

XIV. ORANGE RIVER COLONY:	INCHES.
Jacobsdal	n.r.
Philippolis	n.r.
Bethulie	5·40
Jagersfontein	n.r.
Bloemfontein	n.r.
Smithfield	n.r.
Wepener	n.r.
Kroonstad	n.r.
Fauresmith	n.r.
Frankfort	n.r.
Ladybrand	n.r.
XV. NATAL:	
Durban, Observatory	3·56
XVI. THE TRANSVAAL:	
Johannesburg	2·72
Do. Cemetery	3·25
Doornfontein	2·86
Bremersdorp, Swaziland	n.r.
XVII. BECHUANALAND:	
Vryburg	6·58
Maritzani	n.r.
Mafeking	n.r.
Taungs	3·18
Doornbult	n.r.
Morokwen	n.r.
XVIII. RHODESIA:	
Salisbury	12·70
Hope Fountain	4·21
Geelong	n.r.
Matopa Dam	2·43

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 23rd March, 1901, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ...	0 10 0	0 18 0	0 13 0	0 11 6	0 13 0	0 15 0	0 13 0	0 10 0	1 2 0	0 1 3	0 0 10	0 0 10	0 1 3	0 2 6	£13 to £18	18/- to 20/-
Beaufort West ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burghersdorp ...	0 12 0	...	...	0 13 6	...	0 13 0	...	0 12 0	0 15 0	...	...	0 0 7½	0 1 0	0 6	...	...
Cape Town ...	0 11 0	0 13 6	0 11 0	0 8 0	0 9 6	0 10 0	0 11 0	0 12 0	1 1 0	0 0 6½	0 0 7	0 0 7½	0 1 6	0 3 0	17 0 0	1 4 0
Clanwilliam ...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Colesberg ...	0 12 0	...	...	...	...	0 12 6	...	0 10 0	0 19 0	...	...	0 0 6	0 1 3	..	...	...
Cradock ...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	0 12 6	0 18 0	0 17 6	0 13 6	0 9 6	0 15 9	0 18 0	0 12 6	0 18 6	0 1 6	0 1 0	0 1 0	...	0 3 3	25 0 0	1 5 0
Graaff-Reinet ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graham's Town ...	...	...	...	0 12 0	...	0 12 6	...	...	0 12 0	0 1 6	0 0 8	0 0 9	0 2 1	0 2 4	...	...
Kimberley ...	0 13 0	0 17 0	0 14 6	0 13 6	0 13 6	0 12 6	0 16 0	0 14 0	1 5 0	0 1 6	0 1 0	0 0 10	0 2 6	0 3 0	£17 to £21	18/- to 22/-
King Wm's Town	0 13 6	0 16 6	1 9 0	0 12 6	1 3 6	0 13 6	0 15 6	0 13 6	0 11 9	...	0 0 10	0 0 9	0 1 5	0 2 5	£17 to £25	18/- to 27/-
Malmesbury ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lbs	B. Wheat Flour per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 17 0	0 12 6	0 7 0	..	0 6 0	0 10 0	0 7 6	0 12 0	0 1 3	0 0 9	0 0 9	0 1 3	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	...	..	...	...	..	..	...	...	...	...	...	..	...
Port Alfred	...	...	...	0 10 6	...	...	...	0 7 6	0 12 6	...	...	...	0 2 7	0 2 6	...	...
Port Elizabeth ...	...	...	...	0 11 6	...	0 9 6	...	0 12 0	0 19 6	...	...	...	0 1 6	0 3 0	..	..
Queen's Town ...	0 11 3	0 17 6	0 14 0	0 11 0	0 12 0	0 16 6	0 15 6	0 12 0	0 10 0	0 2 6	0 0 9	0 0 8	0 1 0	0 2 6	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18 6	1 3 6	0 18 6	0 18 0	0 16 9	...	0 13 0	0 18 0	1 0 0	0 1 3	0 0 9	0 0 9	0 2 0	0 2 6	...	...
Worcester ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

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AGRICULTURE.

Reports and Prospects.

Butterworth, *March 1st.*—Since the date of my last report splendid rains have fallen throughout the district, and there is now little doubt that a good harvest of Kaffir-corn and mealies will be reaped. The total rainfall registered was 3·14 inches. Cattle, horses and small stock are in excellent condition; only one fresh outbreak of lung-sickness was reported during the month. J. YOUNG, A.R.M.

Elliotdale, *March 5th*.—Splendid rains fell at seasonable intervals during the month, filling the streams and rivers throughout the district. The Natives are still actively engaged in hoeing their mealie and Kaffir-corn gardens. There is a grand prospect of a heavy harvest for the Natives. Mealies and Kaffir-corn are well advanced and in some parts ripening. The fruit is almost a failure, the peaches and apples having been attacked by moths and other insects. Forage was a failure owing to rust. Large swarms of locusts were hatched on the coast and efforts are being made to destroy them. Soap and water have been used with moderate success, but more success has been met with fungus supplied by the Bacteriological Institute at Grahamstown. Large swarms have been destroyed and many are fast dying. Pasturage is abundant and luxuriant and stock of all descriptions are in good condition. A few cases of scab have broken out and are being dealt with. W. HARGREAVES, R.M.

Flagstaff, *March 1st*.—The crops have made satisfactory progress during the past month, during which the weather on the whole was favourable and seasonable. No diseases amongst stock have been reported and the pasturage is very plentiful and in good order. No locusts have appeared. J. REIN, R.M.

Libode, *March 1st*.—Light showers of rain which fell at frequent intervals during the past month were of great benefit to the growing crops and there is every prospect of an abundant harvest for the Natives. Several small swarms of young locusts made their appearance, although I am of opinion that the crops are too far advanced towards maturity for their being very much damaged. The pasturage is still in excellent condition and stock of all kinds are looking well and without any prevalence of disease amongst them.

J. GARNER, R.M.

Lusikisiki, *Feb. 28th*.—The expectations of a good crop of mealies and Kaffir-corn, mentioned in my report for last month, are in danger of non-fulfilment. Many and large swarms of locusts have hatched out along the coast lands and are now doing irreparable damage among the ripening crops. In the case of mealies the tassels of the cobs appear to be a favourable food. In some lands I noticed that the tops and tassels of the cobs seemed to be the only part of the mealie attacked. When this has been eaten away the cob has little chance of surviving and speedily becomes the prey of grubs, &c. The soap and water mixture has been tried by several traders, one of whom states that in the space of a few days he completely destroyed five large swarms of young ones by spraying them when collected in the evening and early morning. Death, he states, resulted in from two to three minutes after the application. It is, however, almost impossible to use this mixture in many stretches of this district on account of the long grass prevailing, in which the young locusts escape. Cattle and horses are in good condition and are much in

demand. During the month refreshing rains have fallen at regular intervals and the pasturage is consequently looking well.

E. Gilfillan, A.R.M.

Nqamakwe, *Mar. 7th*.—The rainfall for the past month registered 6·63 inches. The veld is looking well and crops are all healthy. In many parts the Natives are using the green mealie; these were sown before the end of the year and escaped being destroyed by the locusts. The seed sown about January last is also looking well and some lands are commencing to flower. A good deal of Kafir-corn has also been sown and in some parts of the district it is commencing to ripen. Cattle and sheep are in fine condition; several cases of miltziekte, redwater and lung-sickness have been reported. Miltziekte is supposed to have been brought from the Colony by transport oxen.

R. Macleod, A.R.M.

Port St. John's, *Mar. 7th*.—The crops throughout the district are looking remarkably well and in a few places they are already being reaped. The Natives have been good in turning out to destroy the young locusts, and I anticipate that the later crops will benefit much by their exertions. Stock of all kinds are in good condition.

W. Turner, R.M.

Tabankulu, *Feb. 28th*.—Abundant rains have fallen throughout the past month, consequently the crops and pasturage are in splendid condition, and there is every indication of a good harvest yield. During the early part of the month we were visited by a most severe hail and wind-storm, some of the hailstones being about 2 inches in diameter, which did a great deal of damage to property and stock; in one case it was reported that out of a flock of 70 sheep 40 were killed. The standing crops where the storm passed over were very much battered and cut to pieces and it was thought few would revive, but with the steady rains and warm days which subsequently followed they have all, with the exception of one or two cases, recovered. No disease of any kind has been reported amongst stock. A vaccination tour throughout the district has been commenced. The Natives are presenting themselves for vaccination in large numbers, and if they continue doing so it is estimated that about 17,000 to 20,000 will be vaccinated.

R. H. Wilson, A.R.M.

Umtata, *Mar. 5th*.—The past month has been dry and hot, especially the latter half. In parts the mealie crop has suffered severely and rain is much needed. With the exception of an outbreak of quarter-evil in one location, stock are in a healthy condition.

A. Stanford, R.M.

Willowvale, *Feb. 28th*.—As already reported last month, there are a large number of horses suspected of glanders, but I am daily expecting the veterinary surgeon, when, I trust, the question will be

finally settled. Owing to the richness of the veld, a large number of sheep and goats have died of gall-sickness and similar diseases; otherwise stock are in a healthy condition. The crops are flourishing, and the destruction of young locusts continues.

M. LIEFELDT, R.M.

The Chemical Composition of the Soils of the South-Western Districts of the Cape Colony.

By CHAS. F. JURITZ, M.A.

(*Continued from page* 401.)

It is almost to be expected that soils derived essentially from a sandstone formation can scarcely claim to be otherwise than poor. Only six such soils were analysed, all lying on sandstone, in the Caledon Division. Their analytical results are as follows:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—CALEDON.							
Field-Cornetcy: Bot and Palmiet Rivers.							
191 Dasjesfontein	1.27	6·43	·0034	·13	·098	·060	·12
Field-Cornetcy: Caledon							
192 Klipheuvel	2·05	8·30	·0031	·19	·080	·078	·077
193 Dunghye Park	1·49	5·81	·0021	·14	·038	·048	·072
Field-Cornetcy: Uilen Kraal,							
194 Paarde Berg	·88	3·37	·0049	·091	·054	·041	·046
195 ,, ...	1·57	5·21	·0055	·13	·029	·24	·032
Field-Cornetcy: Goudini							
196 Klein Wolvegat	1·38	6·57	·0097	·17	·025	·045	·036

Lime is lacking right through the series; but for one exception this would be true of potash as well; of the latter there is a satisfactory amount in No. 195. The last 3 soils are poor in phosphoric oxide; there is a fair amount in Nos. 192 and 193, and No. 191 is really good in this particular. No. 194, I would remark in passing, is found by Mr. De Villiers, the occupant of the farm, to be very poor, the ears of corn generally shrivelling up without coming to perfection, whereas No. 195, though really even poorer in lime and phosphoric oxide, was stated by him to be very rich, due no doubt to the amount of potash it contains.

The samples collected from above the Witteberg beds were ten in number, and the results of their analyses are given in the following table:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—CALEDON.							
Field-Cornetcy: Zwart River.							
197 Bok Kraal	1·06	3·85	·0061	·13	·034	·076	·038
DIVISION—ROBERTSON.							
Field-Cornetcy: Voor Cogmans Kloof.							
198 Riet Vallei	1·54	2·45	·0071	·077	2·65	·15	·017
199 ,, ...	1·26	3·64	·014	·11	·89	·070	·0037
Field-Cornetcy: Robertson.							
200 Hex River	2·09	7·60	·095	·098	1·20	·12	·083
DIVISION—SWELLENDAM.							
Field-Cornetcy: Swellendam.							
201 Klippe River	·86	6·26	·018	·16	·29	·12	·040
202 Distelsfontein	·65	4·30	·0019	·042	·16	·074	·052
203 Bonteboks Kloof ..	1·81	6·76	·019	·098	·63	·23	·044
Field-Cornetcy: Breede River.							
204 Zwartklip	1·35	5·38	·0068	·077	·45	·23	·018
Field-Cornetcy: Klip River.							
205 Boschjesmans Pad ..	1·43	5·60	.015	·084	·46	·10	·010
DIVISION—RIVERSDALE.							
Field-Cornet: Vette River.							
206 Kweek Kraal	2·66	6·59	·040	·11	·16	·22	·13

Compared with the other soils examined, these Witteberg soils show remarkably high percentages of lime. Only one is deficient, namely No. 197, a Caledon soil, which in this respect conforms to the generality of soils in that division. No. 202, in appearance, general character and composition, approaches nearest to the soils of the Caledon Division, but even here the percentage of lime is fair; this is also the case with sample No. 206; Nos. 201, 204 and 205 contain a satisfactory quantity of lime, 199 and 203 are really good in this respect, while 198 and 200 are decidedly rich. The soils of this series all yield a fair proportion of potash, but there are only two—namely, Nos. 200 and 202—that can be described as anything else than absolutely poor in phosphates, while No. 202 borders on poverty and No. 200 is slightly better off, though not satisfactory.

Coming to the soils overlying the more recent formations, 21

samples were taken from the Enon deposits, chiefly in the Riversdale and Mossel Bay Divisions; these yielded the following analytical results:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—SWELLENDAM.							
Field-Cornetcy: Heidelberg.							
207 Duivenhoks Rivier ...	·21	2·16	·0057	·063	·64	·033	·011
Field-Cornetcy: Karnemelk River.							
208 Hooi Kraal	1·64	4·97	·053	·15	·51	·11	·015
DIVISION—RIVERSDALE.							
Field-Cornetcy: Vette Rivier.							
209 Vette Rivier	·91	1·66	·0088	·056	·093	·22	·13
Field-Cornetcy: Krombeks Rivier.							
210 Spiegel Rivier	4·27	4·71	·020	·056	·075	·27	·065
211 ,, ,, ...	4·35	5·95	·019	·084	·025	·26	·099
Field-Cornetcy: Riversdale.							
212 Novo..	3·32	4·98	·012	·028	·15	·11	·078
213 Kruis Rivier	1·13	2·99	·013	·028	·13	·24	·11
214 Doorn Kraal	2·08	3·85	·054	·028	·18	·28	·061
Field-Cornetcy: Valsch Rivier.							
215 Assegaai Bosch	1·88	3·57	·013	·030	·23	·082	·061
Field-Cornetcy: Buffels Kraal.							
216 Zandfontein.	4·27	5·45	·014	·14	·93	·29	·22
DIVISION—MOSSEL BAY.							
Field-Cornetcy: Upper Gouritz River.							
217 Hemelrood	1·58	3·54	·011	·028	·10	·39	·074
218 Heuning Bosch	2·52	4·93	·016	·042	·16	·20	·054
Field-Cornetcy: Before Attaquas Kloof.							
219 Hagel Kraal	2·66	5·67	·011	·030	·15	·25	·11
220 ,, ,, ...	2·75	4·47	·040	·17	·13	·36	·059
221 Ruiter Bosch	1·97	4·17	·012	·044	·15	·080	·064
Field-Cornetcy: Brak River.							
222 Great Brak River ..	2·73	5·01	·0079	·046	·39	·58	·056
223 ,, ,, ,, ...	1·97	6·29	·047	·044	·30	·34	·10
224 Klipheuvel	2·12	4·41	·044	·057	·31	·56	·092
225 ,, ...	1·05	2·13	·044	·029	·15	·26	·058
226 Geelbeks Vallei	2·21	5·71	·057	·056	·40	·76	·15
227 Hartenbosch	·46	·89	·021	·045	·11	·14	·046

Here for the first time we meet with some really good all-round

soils. Many of the others have been found to be rich in one or two of the three essential inorganic plant-food constituents, but in all cases this has been counterbalanced by a lack of one, frequently of two constituents, and phosphoric oxide has generally been the one lacking. Now we come across a few samples which are in every respect satisfactory, and especially prominent are Nos. 216 and 226. The former of these two soils is typical of the Gouritz River Basin; the richness of the latter is tempered by its being brack. In respect of the fertilising elements the samples from 212 to 226 inclusive constitute the most satisfactory group of the entire range of soils examined. Though it would be too much to say that addition of suitable fertilisers will not improve their quality, yet it is certain that none of them are in any respect what may be called poor soils.

From the surface deposits and sands along the Bredasdorp and Riversdale coast 5 samples were collected; these yielded the following results:—

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—BREDASDORP.							
Field-Cornetcy: Bredasdorp.							
228 Nachtwacht	·54	[illegible]·83	·011	·15	·25	·076	·028
229 ,, ...	1·10	5·65	·018	·16	·40	·12	·015
230 Matjesfontein	·92	5·30	·011	·16	·31	·23	·0038
DIVISION—RIVERSDALE.							
Field-Cornetcy: Onder Duivenhoks River.							
231 Honigfontein	1·49	2·23	·001	·059	·44	·074	·098
232 Watergat	·82	2·47	·003	·030	·19	·25	·082

As their formation would lead one to expect, the amount of lime is not unsatisfactory in these soils; nor indeed is the potash, but the phosphates stand in need of augmentation, especially in the three Bredasdorp soils, which are decidedly poor.

One more sample completes our list; it was taken from the Dwyka formation north-west of Robertson, and its analytical results are as follows:

Name of Farm and No. of Sample.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
DIVISION—ROBERTSON.							
Field-Cornetcy: Robertson.							
233 Hex River	·38	1·53	·0053	·13	·34	·066	·036

The amount of lime in this sample is normal; there is not much but still a fair quantity of potash, but the almost generally prevalent poverty in phosphates is again noticeable. Of course, to draw any general conclusions from the analysis of a single sample is out of the question.

Rather interesting results were yielded by analyses of six soils from the Malmesbury District, which may be taken as supplementary to the main series of investigations. While travelling in the district mentioned my attention had been more than once drawn by the local farmers to numerous slight elevations, from 1 to 4 feet in height, and 20 or more yards in diameter; the soil of these hillocks was alleged to be extremely rich, and cereals of all kinds were said to grow on them with luxuriance, while on the lower ground, between the elevations, the soil would be poor and produce scanty crops. It was represented to me that if these lower portions could be worked up by artificial fertilisers so as to equal in fertility the soil of the hillocks, a great improvement in the average yield of the crops would be discernible. I was further told that it was not the practice ever to manure these hillocks, and that there were some lands on which wheat had been sown for nearly a century without the hillocks either getting any manure or becoming exhausted. Mr. J. P. Cloete, Alexanderfontein, states that for the last four years he has been urging farmers to use lime largely on the poor, cold soils, between the hillocks; but, he added, "I am sorry to say that though I have preached, they have not heeded—though I have quoted instances to them of a very poor land having yielded a heavy crop of wheat by the aid of a good dressing of lime."*

In order to ascertain more definitely by chemical analysis what difference, if any, existed between the high- and low-lying soils, samples were procured from some of the hillocks said to be so rich, and also from the adjoining grounds. Those from the hillocks are marked A, B and C; those from the lower grounds A′, B′ and C′. In every case the soil was taken from ground that had been cultivated.

No.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
A	1·574	5·834	·0106	·175	·146	121	·061
B	1·146	3·182	·0078	·189	·072	·075	·072
C	1·472	5·012	·0042	·126	·096	·095	·073
A′	1·010	4·332	·0261	·119	·014	·114	·049
B′	1·092	2·640	·0159	·112	·014	·045	·028
C′	1·278	4·296	·0078	·119	·014	·095	·055

The mechanial analysis of the soil, I may say, did not reveal

* The point had first been raised in connection with the two samples from Karnemelksfontein, Nos. 74 and 75, the former being from high- and the latter from low-lying ground. The retentive power for moisture appeared greater in the case of No. 74, which was also the richer in plant food materials.

anything very striking, there being little difference in fineness of grain between the soil taken from the hillocks and that below.

Taking into consideration the composition of the fine earth, in which determinations of lime, potash and phosphoric oxide were made, it may be said at once that in every case the soils taken from the low-lying ground were exceedingly poor in lime, and herein lies the great difference between the hillock soils and those below; even samples B and C are very deficient in this respect, although considerably superior to samples A′, B′ and C′. A contains lime in fair amount. The potash present in A, B and C is fair in quantity, but B′ is rather poor. A′ and C′ likewise show a moderate percentage of potash, though in each case poorer than the corresponding samples from the hillocks. As far as the phosphates are concerned, there is a fair percentage in the hillock soils, and also, though to a less extent, in sample C′, but A′ and B′ are decidedly poor. Clearly the chemical analysis tends to confirm the popular idea; and yet the difference all round is not as wide as some of the statements made might possibly have led one to expect. To this observation there is just the exception already noted—that of the lime.

Physically, as well as chemically, the hillock soils are slightly superior. In water retentive power their average stands higher than that of the soils around. To this fact I have already alluded. The organic matter in the hillock soils is also better than in the others, and the former are likewise the richer in nitrogen. The inferiority of the low-lying soils also comes out in the amounts of common salt they contain, as indicated by the percentage of chlorine; thus every single one of the seven sets of determinations made shows the soils from the hillocks to be better adapted for agriculture, they contain more of the six useful constituents and less of the one that is harmful.

Some soils were also collected in the Wellington District, where a somewhat similar configuration prevails, and on the farm "Groenberg" a sample of soil E′ from level ground was taken, as well as one E from a hillock. Analysis seemed here also to confirm the popular theory, as may be seen from the following table:—

No.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
E	·76	5·57	·0255	·006	·064	·171	·074
E′	·76	5·11	·006	·003	·037	·084	·077

Of course the characteristics of the Wellington District are not strictly comparable with those of Malmesbury, but it is noteworthy that there is a marked difference in both the lime and potash of these two soils; both are poor in lime, it is true, yet the lime in E is nearly double that in E′. The quantity of potash in E is also quite normal, though it is but moderate in amount in E′.

Under all the circumstances, to revert again to the Malmesbury soils, it seems quite feasible that the process of levelling down the hillocks—said to have been attended with success in one instance—may in some cases lead to an all-round increase in fertility, notably where the hillocks are numerous.

It appears reasonable to suppose, from what these results reveal, that an addition of lime would lead to an improvement. In the Malmesbury District there are numerous outcrops of lime—for instance, on the farms Drooge Vlei, Geelbeksfontein, Springfontein and Lang Riet Vlei. Even if levelling down does not achieve the desired result, there should be plenty of lime near at hand on which to draw for a supply.

It may be useful to compare the average percentage composition of the hillock soils with those from below. The results, calculated on the unsifted soils, are as follows:—

	Lime.	Potash.	Phosphoric Oxide.
Hillock ground	·078	·073	·051
Level ground	·010	·061	·032

Calculated in pounds per acre to a depth of 6 inches of soil, this would amount to:—

	Lime.	Potash.	Phosphoric Oxide.
Hillock ground	1,560	1,460	1,020
Level ground	200	1,220	640

Hence, generally speaking, to bring the latter soils up to the fertility of the former, they would require per acre over half a ton of lime, together with about 200 lbs. of potash and 400 lbs. of phosphoric oxide; in other words, the equivalent of a ton each of Kainit and Thomas' phosphate per acre. At the same time it would not do to rest content with these additions, for so we would only be levelling up the general fertility to that of the hillocks, which are themselves in want of improvement. In fact, the lime in the latter may safely be trebled and the potash and phosphoric oxide doubled.

Reviewing the entire area covered by these analytical investigations, it is difficult, if not impossible, to trace well-defined family resemblances between the members of a series of soils overlying the same geological formation; similarity between samples is geographical rather than geological. For instance, the Caledon soils all present certain distinguishing features, easily discernible on the diagrams, no matter, apparently, whether the underlying rock be Table Mountain sandstone or belong to the Bokkeveld or Witteberg beds; and again, though the Enon soils of the Riversdale and Mossel Bay Divisions are all round the richest, yet they do not differ very widely from the soils of the same districts overlying the Bokkeveld beds.

Without for the moment considering the geological relations of the soil, some interesting information may be afforded by making two cross-country cuts, one almost due east and west from the farm Rietfontein in the western part of the Caledon Division, terminating near the mouth of the Great Brak River; and the other beginning from the same farm, running in an east-south-easterly direction, and reaching the coast about midway between Struys Point and Cape Infanta; as we travel along these lines let us take the soils lying nearest to hand, on either side, for consideration. Taking, then, the south-easterly course first, we meet in succession the soils enumerated in the following list (compare Plate XX.) :—

No.	Lime.	Potash.	Phosphoric Oxide.
118 Rietfontein	·093	·050	·058
119 The Vlei	·028	·056	·036
120 Lang Hoogte..	·083	·073	·032
121 ,, ,, ...	·030	·038	·058
122 Avontuur	·026	·098	·049
124 Muurton	·018	·055	·038
123 ,, ...	·039	·036	·056
125 Klein Steenboks River	·150	·076	·056
126 Weltevreden	·024	·073	·056
127 Dunghye Park	·045	·087	·059
130 Goudini	·016	·072	·036
132 Jongens Klip	·032	·071	·051
131 Roode Vlei	·058	·068	·13
139 Leeuwen River	·15	·18	·026
140 Half Aampjes Kraal	·18	·19	·032
142 Klippe Drift	·37	·13	·028
143 ,, ,, ...	·094	·089	·019
141 Quarrie	·16	·11	·026
147 Nooitgedacht...	·094	·15	·022
145 Koeranna	·15	·15	·030
144 Rem Hoogte	·15	·19	·038
146 Haasjes Drift	·16	·12	·024
148 Patrys Kraal	·20	·098	·010
230 Matjesfontein	·31	·23	·038
228 Nachtwacht	·25	·076	·028
229 ,, ...	·40	·12	·015

A somewhat zigzag course having been taken in passing from point to point, it is scarcely possible for this, as well as for other obvious reasons, to expect anything in the way of regular gradation in the composition of the soils collected along the line; but it is clear that there is a noticeable increase both in lime and potash as we move onwards, and a corresponding decrease in respect of phosphoric oxide. The first few soils of the series are poor in lime and not very satisfactory as to potash and phosphates; the last few are very poor in phosphates, but, with few exceptions, show normal amounts of lime and potash.

Now taking an easterly course from the same starting-point, the following samples come into consideration (compare Plate XXI.) :—

No.	Lime.	Potash.	Phosphoric Oxide.
118 Rietfontein	·093	·050	·058
117 Zwart River	·018	·043	·038
116 " "	·034	·13	·059
137 The Oaks	·041	·045	·056
134 Ganze Kraal	·058	·049	·061
135 " "	·030	·061	·041
136 Tygerhoek	·026	·042	·038
151 Appels Kraal	·044	·049	·015
150 " "	·060	·035	·011
149 " "	·084	·034	0018
152 " "	·058	·10	·014
156 Vryheid	·080	·055	·017
157 Kluitjes Kraal	·084	·14	·022
201 Klippe River...	·29	·12	·040
202 Distelsfontein	·16	·074	·052
160 Kinko	·33	·062	·023
166 Honig Klip	·40	·045	·0080
167 Karnemelk River	·37	·11	·031
208 Hooi Kraal	·51	·11	·015
207 Duivenhoks River	·64	.033	·011
206 Kweek Kraal...	·16	.22	·13
176 Brak River	·12	.13	·058
177 " "	·12	·32	·081
214 Doorn Kraal	·18	·28	·061
213 Kruis Rivier	·13	·24	·11
215 Assegaai Bosch	·23	·082	·061
181 Boschjesfontein	·14	19	·069
182 Middelste Drift	·13	·34	·056
183 Zandfontein	·11	·15	·044
217 Hemelrood	·10	·39	·074
218 Heuningbosch	·16	·20	054
219 Hagel Kraal	·15	·25	·11
220 " "	·13	·36	·059
38 Hartebeeste Kraal	·15	·63	·074
39 " "	·13	·18	·061
22 Great Brak River	·39	·58	·056
223 " "	·30	·34	·10

Here we first of all notice a change of composition somewhat similar to that drawn attention to in connection with the last-mentioned series, an increase with regard to lime and potash, a decrease in phosphoric oxide. This change proceeds more or less regularly up to the village of Heidelberg, but after that the lime undergoes a sudden diminution from ·5 to between ·1 and ·2 per cent., and remains comparatively uniform along the rest of the line; the potash continues to increase more and more, and the phosphates also show a sudden augmentation and remain, like the lime, more or less uniform thereafter. In popular language we may say that the soils, starting the series with a fair amount of phosphoric oxide, though poor in lime and not much better in potash, on reaching the eastern part of the Swellendam Division, become poorer than ever in the first-named constituent, although they show a good amount of lime and a fair quantity of potash. Across the river the lime diminishes and the phosphoric oxide increases, but both still

remain fair throughout, while the potash attains to a normal condition and afterwards becomes in parts really rich, notably in the neighbourhood of the granite formation north of Mossel Bay.

Only 45 soils out of the entire series of 212 examined show normal proportions of lime; the remaining 167 cannot be said to be more than fairly well supplied, and of these 86 are decidedly poor. With regard to phosphoric oxide the case is even worse; here no less than 124 out of the 212 soils must be classed as poor, and of the whole range of samples only 15—that is to say, less than 8 per cent.—reach the normal standard. As to potash, conditions are rather more satisfactory; 57 samples show normal amounts, and only 53 are actually poor. These results show that, as far as my investigations have gone, my surmise of ten years ago was fairly correct; the great want of most of our soils is phosphatic material, and, next to that, lime. And all the while, for years in succession, we have continued exporting bones by hundreds of tons, and bones consist mainly of phosphate of lime and thus supply the very essential most lacking in our soils. Until a few years ago judicious fertilizing was all but absolutely unknown in this Colony; the principle on which manuring was carried on may be instanced by the following: In one of the districts traversed I found that the practice was to manipulate with farmyard manure the lands adjacent to the homestead, guano being reserved for those at greater distances or in less accessible situations—hillsides, for instance. Here there was no inquiry after the needs of the soil and the fitness of the fertiliser to supply those needs; it was all a question of which is the easier to employ. There is an immense amount of education to be done in this respect, and from its very nature and the country's circumstances it is an education that takes time. More rational enquiry is now being made after the proper fertilisers to apply to particular soils than was the case in years gone by. None the less there still is a very extraordinary rush on guano as the hoped-for saviour of the land from all its ills, and people will not recognise that on poor lands this method of treatment results in all the more speedy depletion of the soil, for guano, by virtue mainly of its nitrogen, is a stimulant, and the usual results of stimulants follow its use. What is known to agricultural chemists as the law of the minimum should be borne in mind. Briefly stated, it is this: The growth and development of plant material is regulated by the amount of that particular form of plant food which is present in smallest proportion. If one particular substance required by the plant is deficient in the soil, no excess, however great, of other varieties of plant food will cover the deficiency. The soil may contain abundance of nitrogen, lime and potash, for instance, but if phosphates are absent, or only in small amount, no crop can reach perfection; for one reason, because the quantities of the former taken up are proportionate to the quantity of the latter available; hence, if only *one* of the plant-food constituents is deficient, the crop suffers as much as if *all* were wanting.

Now to supply stimulating manures in such cases is worse than

useless, as the reaction is sure to follow. Under the influence of the stimulant the plant makes, as it were, a special effort to get sufficient phosphates as an adjustment to the other nutritive constituents, and the result is a more rapid impoverishment than would otherwise have been the case, inevitably bringing on a collapse from which no amount of stimulants will be able to rouse the land again.

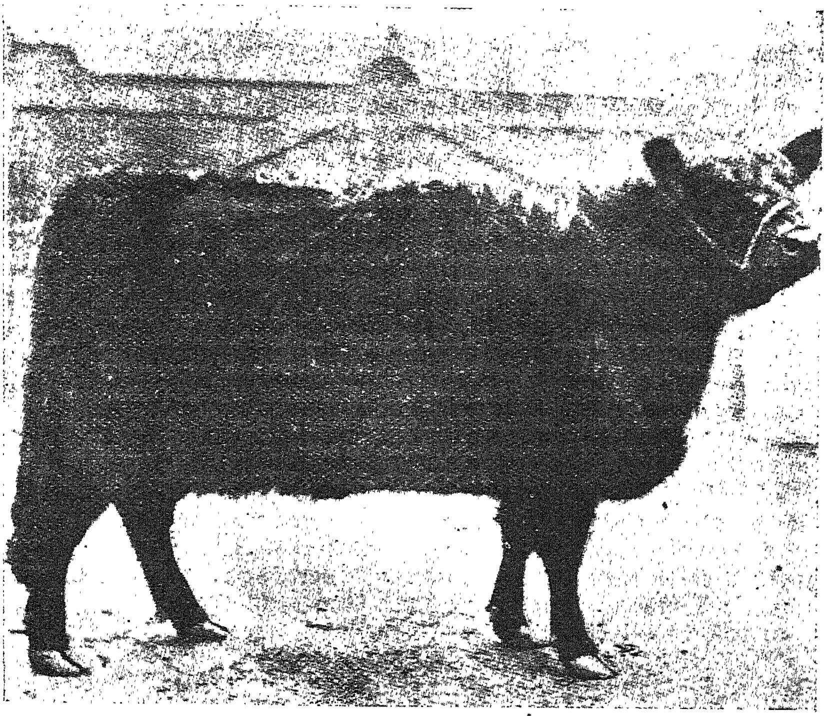
Moreover, the lack of one constituent is sometimes not only the indirect, but the immediate cause of others being deficient. Research has shown that nitrifying bacteria need phosphates for their development: hence lack of phosphates goes hand in hand with retarded nitrification. This latter process, besides, cannot go on except in a soil sufficiently alkaline, and it is therefore also retarded by a defective lime supply, for the lime neutralises acidity in the soil and renders it ready for the reception of the nitric acid formed in the process of nitrification. Thus we see that the supply of nitrogen is also dependent upon the presence of a sufficiency of lime and phosphates in the soil.

From a utilitarian point of view one cannot help regarding it as in the highest degree unfortunate that we should spend millions upon millions in fouling our rivers and other sources of water supply and in casting into the sea what nature meant to be restored to the earth whence it came. Every sewer we construct is in a sense an additional step towards the impoverishment of the land, and all the refuse we cast away instead of employing, tends further in that direction. The recent discoveries regarding the functions of bacteria with respect to the assimilation of nitrogen in the soil help to convince us that the soil is the laboratory where garbage is refined and rendered fit for use, and in our war with nature we are only fighting our own interests by depriving the soil slowly but surely of what is indispensable to it.

With regard to rust and similar diseases in cereal crops, it must be remembered that a well-nourished and cared-for child is, other things being equal, better able to resist the attacks of disease than one living in a vitiated atmosphere, badly fed, and poorly clad. The statistics regarding tuberculosis, for instance, tell an unmistakable tale in this respect. As with human, so with plant life: when a soil becomes exhausted, and the crops are no longer able to draw from it adequate supplies of plant food, they fall an easy prey to the diseases which they resisted successfully while the soil was in better condition. We hear of grain districts where the ravages of rust become more calamitous and more widespread every year. The first, or one of the first, of the warnings given by the hungry land of its approaching exhaustion should not be despised, and the important matter for consideration is not to give the soil some fertiliser, no matter what, at haphazard, but to adjust the manure to the needs of the soil.

STOCK FARMING.

Galloway Cattle.



SCOTTISH QUEEN.

This heifer won the first prize in her class, in the Smithfield Christmas Show, for heifers under three years old, and also £20 as the best animal of the breed in the Show. At the time of her exhibition she was two years and ten months old, her true weight being 12 cwt., 3 qr., 23lb. (1,451 lb.)—*Mark Lane Express.*

The Galloways are one of the two ancient breeds of Scotch polled cattle, the other being the Aberdeen-Angus. They have for many years been bred in their native country, and large herds of them driven south to Suffolk and other eastern counties to be fattened for the London market, where their excellent beef secures top prices They are covered with a fine coat of soft hair, which enables them to bear the rigour of the Scottish climate. They are being introduced into Canada, and the *Farmers' Review*, an American paper, says:—

"The Galloway is one of the most profitable of the beef breeds. Among the points of value are early maturity and high quality of

meat produced. The usefulness of the Galloway in the feed lot is beyond question, and the ability to withstand hard conditions is great. For this reason the reports of success with Galloways come to us from the coldest regions of Canada. As the buffalo has disappeared the Galloway has naturally inherited the business of producing choice robes, and we predict that these robes will be more and more in demand as the years go by. It is extremely difficult to pick a beef breed that will be found superior in all places, and we do not attempt to claim any such superiority for the Galloway. But the writer does claim that in a very large number of cases the Galloway will be found superior to most of its rivals. A short shank and a long loin, as possessed by this animal, means money made out of the grass that goes to build up the frame. It should be remembered that it takes no more feed to produce a pound of fine high-priced loin than it does to produce a pound of almost worthless bone, and hence our breeders naturally desire the cattle that will make the most loin and the least shank."

Reference to buffalo robes reminds us of the extermination of the race from which these most valuable articles were derived, a disappearance of only a few years ago, when they covered the plains in millions.

Angora goat-skins, too, are prepared to take the place of buffalo robes, which were found so useful in the past. We have never heard of any Galloway cattle being imported into this country, but no doubt they may be serviceable stock on a high, cold farm. Youatt gives a most interesting and instructive account of a cross made with this breed and his shorthorns by Mr. Chas. Colling, which was a great success.—EDITOR.

A Hundred Years of Stock-breeding.

A contributor to the *Live Stock Journal* remarks:—

"In looking back through 100 years, we cannot but be struck by the enormous activity and energy of the earlier years of this century in the domain of agriculture. It would be a great mistake to think that progress is, or has been, confined to our time, or that our forefathers were content with things as they were. It is, indeed, open to doubt whether we are more alive to the importance of improvement than were they. When we look through Arthur Young's reports to the Board of Agriculture, published in and about 1800, we are struck by the freshness, vigour and enterprise of the times. Experiments were being made on a large scale in crop cultivation and the feeding of animals. Tull had written, and Bakewell had lived. The Culleys had laid the foundation of future improvements in live stock; and Sir John Sinclair was the active Secretary of the Board of

Agriculture. The opening year of the nineteenth century are replete with interest for breeders of live stock. It is interesting to note that turnip husbandry had been gradually extending through the previous century. In "Lisle's Husbandry" we read of turnips being cultivated even in 1699, but only as a novelty. It would have been impossible to develop live stock without winter feeding, and, to this end, the turnip was essential. Turnip husbandry prepared the way for the improvement of our flocks and herds, which must be considered as the principal feature of British agriculture during the last hundred years. Of the agriculturists who lived and worked at the period under consideration it may be said with truth 'there were giants in those days.' They possessed a grasp of the subject and an energy in carrying out their principles which cannot be excelled. Neither can the importance of those achievements be well over-rated. To have developed early maturity in cattle was alone a wonderful result, and we are liable to forget that it was due to those workers that cattle can be fattened at under five years old, and that the traditional four-year-old mutton has given away to ten-months-old carcases. The movement commenced far back in the previous century, when Bakewell started the Longhorns. In 1791 Mr. Fowler obtained very high prices in Oxfordshire for his Longhorn cattle, and scarcely a county was then without its herd of Longhorn cattle. The Shorthorn superseded the Longhorn, but dates further back than the days of Robert and Charles Colling, who gave a new impulse to the breed. I quote a passage from Bailey's Report on the County of Durham, written in 1796, although the publication was delayed until 1810. Speaking then of farmers, he says:—'In this, as well as in every district I am acquainted with, the occupiers of large farms have been the first to make improvements, to introduce new implements, new modes of culture, and improved breeds of live stock. It is men of education and superior intelligence who travel to examine the cultivation of distant counties and improved breeds of cattle, sheep, and other animals, and who have capital to carry into effect whatever they may think will improve their own districts. Messrs. Culley and Charge were the first that led the way, and they have been followed by Messrs. Colling, Mason, Taylor, Nesham, Seymour, and many others by whose exertions and judicious selection this district will be lastingly benefited.'

The names of the men of that distant time connected with agricultural improvement are too numerous to be mentioned. They included not only extensive farmers but many great landlords and noblemen, among whom Lord Althorp must be mentioned, who were alive to the immense importance of agriculture. The name of Bates ought not to be omitted—born 1776, and died 1849; a man of wonderful ability and energy in connection not only with Shorthorn cattle, but with agriculture generally."

Unprofitable Cows.

On the choice of your dairy cow, whether you breed her or buy her, depends the whole success of your dairy. You wouldn't wish to use the old-fashioned wooden plough of our forefathers, nor go back to the flail, for "it's ill working with poor tools."

And the poorest tool on the face of the earth is a poor cow.

It is not only that she is no profit, it is worse than that—she runs you into debt.

Still worse is the case if the poor cow be one of a herd, and for this reason: If a person keeps but one cow he very soon knows if she be good or bad, but if he keeps a good many, the worthless cow is not so readily detected. She may be a smooth-looking animal, and may even give a fair flow of milk, and yet she may not only fall short of paying for her keep, but be eating up all the profit made by her neighbour, and so the farmer has not a cent of gain on the pair.

And the useless cow is not only deteriorating as years go by, but is perpetuating her worthless kind, to the loss of her owner and to the detriment of all the country around.—*Australian Farm.*

VETERINARY.

Diseases of the Horse.

Roaring.

This is a loud wheezing noise made by a horse in breathing, more particularly when he is excited, engaged in active exercise, or hard work.

Causes.—Roaring is due to some obstruction to the free flow of air through the upper air passages, such as a tumour in the nostril, an abscess or œdematous swelling about the throat, a thickening of the mucous membrane, or anything that causes obstruction to, or contraction of, any portion of the air passages. These causes of roaring are, however, more or less temporary in character, and amenable to treatment. The most common cause of roaring in the horse is paralysis, and wasting of the muscles of the larynx, invariably those on the left side. The originating cause of this paralysis and wasting of the muscles, is still a matter of doubt amongst pathologists, but it is generally agreed that the complaint is hereditary. Whether this heredity is due to something which is

transmitted direct from parent to progeny, or whether it is merely the anatomical arrangement of the structures involved, with their physiological tendency to develop this degenerative paralysis which is inherited, is at present undecided. It is very probably the latter, but whatever the correct explanation may be, the fact remains that the disease is hereditary, hence it is undesirable to breed from animals so affected.

I readily admit that this disease is not nearly so common in South Africa as it is in England, and other European countries. Further, several race horses which have been imported into this Colony which were somewhat severely affected before leaving England, have improved vastly out here. On the other hand, a considerable number have developed the disease after their arrival, so that it is difficult to say how far—if in any degree—the climatic conditions influence the development of the disease.

Symptoms.—When the difficulty of breathing is caused by any obstruction such as a tumour, an abscess, œdema of the throat, or contraction of any part of the air passages, the noise will generally be heard during expiration as well as inspiration, although not so distinct as a rule. But if the cause is paralysis of the muscles of the larynx—the condition that gives rise to what is generally understood as roaring—the noise will be heard during inspiration only, and in these cases in addition to the noise made during inspiration, a roaring horse has a "loud harsh cough, half roar, half cough," and the majority are also "grunters," that is, when the horse is taken firmly by the head, placed against a wall, and threatened with a stick, he gives a grunt. Hence a horse which emits this sound when this test is applied, should be further tried by being either ridden or driven hard up a steep gradient if practicable.

Treatment.—When the wheezing or whistling sound is due to some swelling of the tissues, or thickening of the mucous membrane of the larynx, following acute inflammatory action, the application of iodine liniment, or the iodide of mercury ointment, and the internal administration of one drachm of iodide of potassium daily until its physiological effects become manifest, is often beneficial. This may be followed by a course of arsenic, about three grains daily, which may be continued for a considerable time, leaving it off for two or three days every ten or twelve days.

Tumours in the nasal passages, and any local obstruction, should be removed where practicable. But for a case of real roaring, arising from wasting and paralysis of the laryngeal muscles, there is no satisfactory treatment except an operation—the excision of the arytenoid cartilage, which can only be performed by a skilled expert. Firing, blistering, and the application of electricity to the region of the throat have all been tried, sometimes with partial success when resorted to in the early stages of the disease, but when roaring is once established, the animal is only suitable for slow work.

Broken Wind, or Dyspnœa.

This is an obscure diseased condition of the organs of respiration characterised by a difficulty in breathing of a peculiar nature. The inspiratory movement is accomplished with ease, but the expiratory movement is performed with difficulty, and is only completed by a double effort. It is comparatively rare in this Colony; although the conditions which are generally believed to give rise to it in England and other European countries, are common enough in this Colony.

Causes.—The origin of this diseased condition is generally attributed to the animals being fed on bulky, innutritious food, more especially dry, coarse, musty hay; chronic indigestion and violent exercise on a full stomach are also considered exciting causes of this disease. There can be little doubt that when an animal, which is affected with this complaint, is fed on certain kinds of dry grass hay, it aggravates the symptoms very much, and there is equally strong evidence in support of the opinion that such food has a great deal to do with the origin and development of the affection. But I doubt very much whether dry, coarse, innutritious, bulky food has anything to do with the development of the symptoms. In this Colony the farmers have as yet cultivated very little grass hay, which may account for the rarity of the complaint amongst Colonial-bred horses, but in many parts of the sour-grass veld districts, the horses have nothing but dry, coarse, innutritious grasses, containing a large percentage of woody fibre, to live on for about nine months out of every year; and chronic indigestion, with dilitation of the stomach, is the most serious and common complaint which horses suffer from in those districts, but, notwithstanding, broken wind is rarely met with. Hence I am led to infer that there is something special about the dry hay which gives rise to broken wind.

Pathology.—It is emphysema, or dilitation of the air cells of the lungs with air. Some consider that this arises from a weakening of the elasticity and resiliency of the lungs, while others are of opinion that this dilitation of the air cells is due to paralysis of the fine muscular fibres which surround the small bronchial tubes and air cells. It is very probable that both the muscular and elastic tissues are affected, as the disease is generally believed to be due to some disorder of the nerves, associated with derangement of the digestive organs.

Symptoms.—As before stated, inspiration is natural and easy, while the expiratory movement is difficult and only completed by a second effort. In the first attempt the abdominal muscles are drawn inwards, and after a perceptible interval the second contraction is made, when the muscles of the flank are drawn up with a spasmodic effort, at the conclusion of which the muscles relax, and the flanks fall with a sudden drop. There is a peculiar short dry cough, which occurs in paroxysms, often when the animal is first brought out in the morning, or after having had a drink of water. Broken wind is generally associated with indigestion and a morbid appetite, and there is a frequent passage of wind from the bowels—breaking

wind; the animal also perspires freely when at work. In bad cases there is a peculiar movement of the nostrils, but these symptoms may not be very clearly marked until the animal gets active exercise. In doubtful cases, the animal should get a drink of cold water, and be given a gallop, or other severe exercise immediately after, when the symptoms will become intensified.

Treatment.—This can only be palliative; there is no known cure. The animal should receive nourishing food, but care should be exercised to prevent overloading the stomach with bulky food. Dry grass hay should be avoided, but green food of any kind is beneficial, and when that is not procurable, give bran to keep the bowels acting, as there is a tendency to indigestion and constipation. All dry food, such as oathay, chaff, &c., should be slightly moistened, and water should be supplied sparingly either before or during work, but when the day's work is finished, water may be freely given. The same remarks apply to feeding also; a horse should not be worked on a full stomach.

With respect to medicine, a continued course of arsenic has been strongly recommended. This may be given either in the form of Liquor Arsenicalis—a tablespoonful morning and evening in a bucket of drinking water, or three grains of white arsenic laid on the horse's tongue once a day. This may be continued for weeks, but it is necessary to watch lest the physiological effects of the drug become manifest, when its administration should be stopped at once, and a dose of oil given. To obviate this, a good plan is to stop giving the arsenic for three days at the end of every ten days. To give daily a mixture containing two ounces each of raw linseed oil and lime-water is said to act very well.

Tetanus, or Lockjaw.

This disease may occur in all the domestic animals, but in practice it is rarely met with except in man, the horse, ass and mule.

Nature and *Cause.*—It is a disease characterized by the gradual onset of severe and painful spasmodic contraction of the voluntary muscles. The spasms of the muscles become continuous, but any noise or excitement increases the paroxysms. Its originating cause is the absorption of a soluble poison, the product of a drumstick-shaped micro-organism called the "Bacillus tetani," which exists in garden soil, and enters the system by any wound or abrasion of the skin. Either the wound has been made by some object soiled with earth, or dung, containing these bacilli, or the wound has subsequently become contaminated with these substances. The wound may be very small, a mere abrasion. "In some cases—especially in the tropics—it may be only the bite of an insect. The absence of any visible wound in some cases has given rise to the term 'idiopathic' tetanus, but no doubt is now entertained that all cases are due to 'Bacillus tetani.'

"This disease can be experimentally communicated to animals by any of the usual methods of inoculation, but it does not arise in animals fed with bacilli, whether these contain spores or not. The bacilli are never found in the blood or organs but are localised at the point of inoculation, and lymph glands associated with the seat of infection.

"The bacilli multiply at the seat of inoculation, where they produce poisons which diffuse into the tissues, and have an elective action as stimulants, especially of the spinal cord. The toxin has no effect on the sensory or motor endings of the nerves, it acts solely as an exciter of the reflex excitability of the motor cells of the spinal cord, the pons and medulla" (Muir and Ritchie). The period of incubation ranges from one to three days in small animals such as mice, guinea pigs and rabbits, to as long as twenty-two days—or even more in large animals. "In a case of wound infection in a laboratory the period was four days. The shorter the time between the infection and the appearance of tetanus, the more pronounced is the course of the disease, and the worse the prognosis" (Bowhill).

There is an interesting question in connection with tetanus, viz., granted that the Bacillus tetani is so widely present in the soil, how is it that the disease is not more common than it is, for wounds must constantly be contaminated with such soil.

The explanation appears to be that in addition to the bacilli in the wound, a local irritant such as soil, a splinter of wood, or the presence of other bacteria, is necessary to cause the development of the disease; spores alone, or tetanus bacilli without spores, die in the tissues and tetanus does not result (Muir and Ritchie).

"The tetanus bacillus is anærobic; it grows well in an atmosphere of hydrogen, but not in carbonic acid." The spores are killed when exposed to steam at a temperature of 212° Fahr.; when dried at a temperature of 100° Fahr. with free access of air the poison is destroyed. Direct sunlight destroys its poisonous properties in eighteen hours. A solution of corrosive sublimate 1 to 1,000 with ½ per cent. hydrochloric acid added, kills them in thirty minutes.

Symptoms.—There is a gradual stiffening of the muscles over the whole body, more especially the muscles of the neck, which become hard and rigid. The head is elevated, the nose protruded and the jaws fixed, or only capable of opening a little. If the horse is excited the eye is retracted and the haw or cartilage of the eye will be observed to flick over it; the tail is carried straight out with a trembling motion; the legs stand rigid, a little wider apart than natural, and if the horse is made to walk, the legs are moved forward without bending. The spasm of the muscles in tetanus is continuous, but any noise or excitement increases the paroxysms. The affected animal rarely lies down until completely worn out, when it tumbles down, and its ineffectual struggles to get up again very soon exhaust its strength. The bowels are invariably constipated, the breathing is much quickened and short, about 40 to 50 respirations per minute, but the pulse is not much quickened, generally about 40, a

full distinct pulsation is felt, until towards the end, when it becomes weak and hard, the temperature is not much altered generally.

Treatment.—This is preventive and curative. Preventive treatment consists in the careful cleaning out of all foreign matter from every wound as soon as possible after it has been inflicted, and the thorough dressing of it with some strong antiseptic, such as a solution of corrosive sublimate 1 to 1,000, with ½ per cent. of hydrochloric acid added, or a 10 per cent. solution of carbolic acid. Should the disease be prevalent in any locality it would be advisable—where practicable—in all cases of suspicious wounds, to inject a dose of anti-tetanic serum, which acts as an effective preventive. Anti-tetanic serum is obtained from a horse which has been immunised and fortified by graduated doses of toxin, similar to the manner in which cattle are immunised and fortified for the production of a strong anti-rinderpest serum, by repeated injections of graduated doses of virulent rinderpest blood. With respect to the curative effects of anti-tetanic serum, the general experience is that where the symptoms have become fully manifested before the serum is applied, only a very small proportion of cases can be saved, even when the serum is injected in large doses. Drs. Borrel and Rouse give an explanation of this; they discovered that an animal rendered immune against injections under the skin was not immune against injections into the substance of the brain, and from that they conclude that subcutaneous injections of anti-toxin do not affect the nerve cells, and do not protect them. The same occurs when, for therapeutic purposes, serum is injected into an animal which has commenced to manifest the symptoms of tetanus, the nerve substance being already attacked by the toxin, the serum does not reach the nerve cells, and therefore the toxin can continue its deadly effect undisturbed. This explains the many failures to treat tetanus by anti-toxin. The same authorities then tried to treat the disease by conveying the anti-toxin direct to the brain substance, and were thus able to cure rabbits and guinea-pigs, even when the disease had prevailed for some hours, and very small quantities of serum were sufficient (Bowhill).

With respect to the general and medicinal treatment of tetanus, the animal should be examined carefully in order—if possible—to discover the wound by which the bacilli entered. If it arises from a prick received in shoeing, or from picking up a nail, take off the shoe, clean out the wound carefully, and place the foot in hot water containing 1 to 1,000 of corrosive sublimate with ½ per cent. hydrochloric acid added, or a strong solution of carbolic acid, then place it in a hot bran poultice made, and kept moist, with a similar solution. If it arises from a wound on any other part of the body, foment the part well with either of the solutions above mentioned, applied as hot as the hand can bear, and repeat the application at short intervals. In the intervals apply a dressing of carbolic acid 1 part, glycerine 5 parts, and water 5 parts. Place the horse in a dark box away from all noise and dis-

turbance; allow no one near him but his attendant. After a day or two, and before he becomes too tired, place slings under him, and arrange them to press easy and comfortably, so that he can rest in them when he chooses. Give a strong purgative immediately, if his jaws are not already too fixed to admit of it. If so fixed, give repeated injections of oil and soap suds, with a little turpentine added to move the bowels. Arrange the manger high, so that the patient may get his head into it with ease, as there is great difficulty in bending the head. A great number of remedies have been tried in the treatment of tetanus, with but moderate success.

I have found that one ounce of chloral hydrate dissolved in a quart of water, and injected up the rectum three times a day, acted as well as anything else I have tried. The patient should be fed on thin bran and water, or meal gruel, and as soon as the jaws begin to move, give carrots thinly sliced, or other green food, and the body should be comfortably clothed.

The other remedies recommended are calabar beans, woorara, prussic acid, chloroform, hyocyamus, canabis indicus, &c. The most essential consideration, however, is perfect quietude and careful attention. In the early stages, large doses of anti-tetanic serum may be tried.

D. Hutcheon, C.V.S.

DAIRYING.

Milking.

We are indebted to Mr. Arthur Muller, of Clare College, Cambridge, for the appended translation of a prize essay by Mr. J. Petersen, of Dalum Agricultural College, Odense, Denmark, who was adjudged a prize winner:—

CHAPTER I.

Introductory.

The udder is, from the point of view of the milker, the cow's most important part.

That a proper use develops the living instrument is a maxim which applies to the udder of a cow as well as to a multitude of other things.

That use develops the instrument is easily shown by example. A workman knows that unusual labour causes a strain at first. The

sower feels tired in his right arm, the harvester tired in the back, the milker tired in his arms and hands, etc., but before long they accomplish the one-sided work without feeling much strain or tiredness.

Only the use which causes considerable exertion brings on further development. The way to exert the udder is to milk it completely dry. The milker should imitate the greedy calf, which sucks the last drop of milk out of the teat. This causes a greater flow of blood to the glands of the udder, and it is from the blood that all material for further development and for the forming of more milk must be sought.

It is in the above facts that one finds an explanation of the case (so common in Denmark) of the agricultural labourer's wife getting quite a lot of milk from her cow, which on a large farm would be found useless for the dairy.

Whoever undertakes milking should certainly know the above facts.

CHAPTER II.

How to Milk.

The object of milking is to empty—as completely as possible—all the milk present in the udder, and in such a way that the cow finds it a pleasant sensation, and that the milk is kept clean.

The cow is by Nature meant to nourish its young. We ought therefore to learn from the calf. The latter does not suck its mother in a brutal manner—on the contrary, it knows by instinct that if it wants milk it must behave properly. Therefore it never grabs a teat at once, but asks, by touching the belly and then the udder, if it may.

The milker ought to begin by speaking kindly to the cow, patting it, and afterwards with the back of the hand rubbing it gently on the belly and udder. By this means one not only puts the cow into a good temper, but the rubbing helps to get rid of loose hairs, scales and dust, etc., which otherwise easily find their way into the milk pail.

Next the milk pail is placed under the udder (always on the same si le of the same cow), and the work is begun by catching hold round both the front teats with the whole hands. The hands are now in turn moved up against the udder with a gentle pressure and they are then closed slowly and softly (likewise in turn) about the teat, the closing beginning at the top and extending downwards.

These gentle movements should be continued until one notices that the cow lets the milk "come." The milk must now be emptied out in long unbroken jets by means of the same movements of the hands as before, but applied with more vigour than at the beginning. For every fresh grip the hand ought to exert a new pressure up against the udder, while at the same moment the first finger and

thumb should grasp that portion of the udder which lies exactly above the teat. During this part of the milking the conscientious milker ought to fix the whole of his attention on his work, since *every interruption means a loss of milk.* Hence all loud talk or noise, which disturbs the cow as well as the man, is to be strictly avoided. A good enlivening song need not, however, be out of place.

When the front teats give no more milk, the work is carried on—without the preliminaries of patting, rubbing and so on—in the same way as regards the back teats.

The milk must be *squeezed*—not dragged—out of the teat. The teat should therefore be grasped with the whole hand, and the latter must not slide up and down the teat more than necessary. The sort of milking which is carried out by grasping the top of the teat with the thumb and first finger or thumb and second finger (the latter is the worse) and then pressing the fingers together and dragging them down the teat, is very bad indeed. The cow does not like it since it irritates the skin on the teat, and easily causes sores, and it is really much harder work for the milker.

In the case of those heifers, however, whose teats are too short for the whole hand to grasp them, the fingers must of course be used.

The milking is not over, even when the back teats (or the last milked) give no more milk. *A vigorous second milking must now take place.* After one has again changed a few times from the first milked to the last milked teat and back again, the udder must be thoroughly "worked" by means of gentle handling and afterwards the last drops of milk must be squeezed out of the teats.

Here we could also learn from Nature. Look at the lamb, when it sucks! See how it pushes its mother's udder when the teat gives too little milk.

The little pig also can be seen poking its mother by means of its soft snout, so as to get all the milk possible.

One would almost think that they found the last milk sweeter than the first! So they no doubt do, as it has been proved by a number of investigations that it is *by far* the richest.

If the first half pounds of milk are mixed (equal amounts being taken from the four teats) from each of say 40 cows, the 20 pounds of milk thus collected will as a rule not even produce half a pound of butter.

But if in the same way one were to collect the last half pounds, which after inadequate milking can still be worked out of the udders of the same 40 cows, nearly 2 pounds of butter can be got out of the 20 pounds of milk.

Any milker can roughly prove this for himself. Collect the first jet from a teat in a small glass, and the last jet (or the last drops) which can be squeezed out of the same teat in another glass. Place the two small glasses in a cool place; and after 24 hours it is astonishing to see the great difference there is in the layer of cream. The first milk is only good skimmed milk, while the last is nearly

thin cream. Getting out all the possible milk is therefore of importance not only for the development of the cow's power of giving milk, but also for obtaining rich milk. Thus the milker who does not take sufficient time to milk the cow quite dry, either does not know her or his work, or is not carrying it out conscientiously.

After the milking is finished the cow should again be patted in a soothing way, and a kind word may again be said to her.

The milker should always keep an eye on the state of health of the udder and teats. If swellings or lumps or tenderness in the udder, sores on the teats, or blocked milk channels are observed, or the milk looks unnatural (for example, lumpy, reddish, etc.), the owner or other responsible person should be at once informed.

As diseases of the udder and teats are often infectious, such cows should always be milked last, and the milk from the diseased udder should be carefully put in a separate pail and thoroughly disinfected (and then thrown away, of course) or thrown away where it cannot spread the infection.

The milk canal inside the teat is occasionally very narrow or has a frequent tendency to get blocked. To make use of a straw or such means to clear it, is very wrong, as it can set up inflammation in the corresponding gland. A teat with a blocked milk canal should be rolled gently between the hands held out flat and then carefully milked.

After the first calf the heifer is apt to feel tender and hence inclined to object to the milker's touch. This tenderness lasts, in a few cases, to the later years. In such cases one must set about milking with even greater gentleness and care. Nothing but kindness should be used unless the cow is very "wicked."

To milk quite dry, as a means of increasing the milk-giving power of a cow, is especially important in the case of a heifer after its first calf; since it acts with even greater power on the heifer than on the older cow.

It would be a good thing if every milker was provided with two smocks of washable material, one being always in the wash or clean, so that a clean one may be put on at least once a week. As one ought to milk with bare arms, these blouses should have short sleeves and be made so that they can easily be slipped on over the ordinary dress.

In wet weather, when milking is done out of doors, a waterproof cloak is almost a necessity.

It should be a point of honour for the milker to see that all pails, etc., in which the milk is collected should be absolutely clean. This scrupulous cleanliness is of course a necessity. The pails, etc., are best made of tin-plated steel and must not be allowed to rust.

Complete cleaning is best and most easily done as follows: Immediately they are finished with, the pails are washed with 2 or 3 lots of cold water; afterwards they are completely covered both inside and outside with thick lime water, then scrubbed with cold water, rinsed and washed again 2 or 3 times in *clean* cold water and

finally in clean boiling water, and then allowed to drain dry in the open air; they must *not be* wiped with a cloth nor with anything else.

Be it morning, noon or evening, the hands must be carefully washed before going to milking, and if the milking is done indoors one should also wash and dry the hands whenever they get at all dirty.

For the sake of cleanliness it is best to milk with dry hands.

CHAPTER III.

Whoever has the care of the cows, it should be their object to keep them clean. If the udder is in a filthy condition it must, before milking is begun, be washed clean with lukewarm water and rubbed dry with a piece of cloth.

Milk has great capacity for absorbing gases from the air, and since it offers an extensive surface as it passes in jets through the air between the teat and the pail, the air in the shed should—especially during milking—be kept as pure as one can possibly keep it. For this reason, if the cows are indoors, they should be made to stand up a little while before milking begins. They will then probably get rid of their manure. Afterwards all available doors and windows should be opened for a few minutes, the litter is arranged and things are put in order, so that everything is as it should be when the milking is to begin.

Light helps to keep the air pure, so one should always have plenty of daylight in the shed; and if the cows are milked indoors in the dark winter mornings and evenings, plenty of lantern light gives a better chance of good and clean milking.

Milking Times.

If a cow is milked three times in every twenty-four hours the milk obtained is both more *abundant and richer* than if milking takes place only twice a day. But whether one milks three times or only twice daily, the times between the milkings should always be as nearly as possible of the same length.

The cow is a creature of *habit*; its udder works steadily and regularly. *Hence the milking times should be most carefully kept,* and the same pair of hands should milk the same cows in the same order. If milking is begun too late the cow becomes restless, and as regards those which give much milk the tension in the udder can give pain—in all cases milk is lost.

Altogether it ought to be clearly realized that the cow repays all unpleasantness by giving less milk.

Good Advice (in brief).

(1) *The cow is a living creature.*
Use her kindly and you get more milk from her.

(2) *Use develops the living instrument.*
  a. Milk dry! Milking dry develops the udder and consequently the power of giving milk.
  b. And one obtains richer milk, *since the very last milk is by far the richest.*

(3) *Milk in the right manner.*
  a. Grasp the teat with the whole hand.
  b. *Press* the milk out.
  c. Don't forget the gentle push up against the udder.
  d. Never stop nor let the work be interrupted when milk is "coming."
  e. Remember the second milking and the last drops.
  f. Pat the cow when you have finished milking.

(4) *Cleanly milking.*
  a. Have clean pails (to milk into and for carrying the milk).
  b. Wash your hands before and (in the shed) during milking.
  c. It is best to milk with dry hands.
  d. Milk in a suitable and clean smock.

(5) *The state of health of the udder.*
  a. Tenderness or hard lumps in the udder or on the teats,
  b. Blocked milk channel, etc., or
  c. Unnatural looking milk—should all be *at once* reported to the owner or other responsible person.

(6) Milking Times.
  a. Begin at a fixed time.
  b. Milk the same cows in the same order.

To whoever has charge of the cows:—
  (1) Clean cows.
  (2) Good air in the shed.
  (3) Plenty of light.

The Goat in the Dairy

Doubtless one of the peculiarities of the goat is a certain odour which appertains to it more or less as the seasons vary. All the species of the sheep family, to which the goat belongs, have a special odour, and this is more apparent in the goat than in the sheep. But it is a peculiarity of this odour, as of many others pertaining to many plants, and to some drugs, that it is only disagreeable when it is strong, otherwise it is not only easily bearable but at times and under some circumstances it is pleasing to some persons. This subject of odour is especially a prominent one in regard to cheese, the curing of some kinds of which is purposely so managed as to develop the quality to such an extent, as to be disagreeable to some persons while it is distinctly pleasant, or at least agreeable and quite

satisfactory, to others. On this account the French, as well as the German, and especially the Dutch and Swiss dairymen, have been in the habit of making cheese of an especially pronounced odour and flavour, and in pursuit of this habit some of them have used the milk of the goat in part with that of the sheep and the cow in the making of cheese. But while in some instances the milk of the sheep is used wholly as the basis of a special kind of cheese, that of the goat is only used when mixed with the ewe's or cow's milk, simply for the purpose of securing the special flavour of it, which seems to be a quality much desired by some persons. And as the special kinds of cheese thus made find a market in our large cities to a considerable extent, it is quite probable that the making of this kind of cheese may become an established and quite profitable industry. And in fact, in view of the great enterprise and ingenuity of the American citizen in all the business of life, it may easily become so to an enlarged extent, when goat's milk cheese shall be offered in our markets.

The cheese described is made in the south-western part of France and the adjoining part of Italy, and chiefly on that noted mountain country known as Mont Cenis, over which Napoleon led his army through narrow defiles and along precipitous benches, wide enough for only one horse or man to pass at once, and on which the adventurous traveller passing over only maintains his position on the mule's back by shutting his eyes and trusting to his luck and the surefootedness of his animal. Away up on these mountain sides there are great stretches of verdant meadows covered with the sweetest herbage and watered by the purest springs. Indeed, it is mainly due—we may think—to the sweet feed and the pure water and air that the milk of the animals there pastured is able to yield the flavour which gives to the cheese its high excellence and value, developed, however, by the special methods of curing and ripening.

It would be scarcely worth the time spent to describe the methods by which this and the Roquefort cheese are made were it not that we on this side of the world possess every facility and every condition for this same industry. All the way from the border of our great western states and to some extent in the east we have the mountain pastures, the elevated plains, the pure atmosphere and the feed and water which all combine to make the duly flavoured and rich milk, which is the raw material of these profitable products. In short, all we have to do is to go in and take advantage of the rich gifts of nature we possess, and with our native skill, ingenuity and enterprise, we may be sure there has never yet been anything worth doing that has been done in the world but it may be done better than ever between both of our interminable oceans. We rule the world in great things, and why not in the small things, which all go to bring wealth to our industrious, intelligent citizens!

American Sheep Breeder.

Skim Milk as Human Food.

A correspondent of the *Auckland News*, New Zealand, calls attention, as follows, to the value of this somewhat underrated dairy production as an article of food, especially for children and working people:—

"It may not be generally known that skim-milk contains nearly all of the food value of the original milk, with the exception of the fat, and even this may be present to the extent of 1.10 to 1 per cent. It contains from 3½ to 4 per cent. of protein, about 5 per cent. of milk sugar, and 8 per cent. of ash or mineral matter. Its chief value is as a muscle-making food, and hence it is of great value to growing children or labouring people. Its economy as an article of diet can best be shown by comparing it with other foods. An American journal says: 'Twenty-five cents will purchase 6½ times as much total nutrients and five times as much protein in skim-milk at two cents a quart as in sirloin steak at 22 cents, or four times as much nutrients and 3½ times as much protein as mutton shoulder at 15 cents a pound. Or three quarts of skim-milk, worth from six cents to eight cents at retail, will hold more total nutrients and more protein than a pound of round steak. At the present prices the only common food materials that will furnish more protein for a given sum of money than skim-milk are beans, wheat flour, oatmeal, maizemeal, and salt codfish. Nevertheless, in New York and King's Counties, of the State of New Jersey, and all first-class cities in the State of New Jersey, law forbids the sale of skim-milk, one of the cheapest of all wholesome foods. Those responsible for this, silliest of all foolish laws, are sadly in need of some good brain food, provided they have (which is doubtful) the requisite foundation to build brain upon.' It is not surprising, then, in the face of these facts, to see how pigs and calves thrive on skim-milk!"

HORTICULTURE.

The Dried Fig Industry.

FIG WASP IN CALIFORNIA. SUCCESSFULLY ACCLIMATISED.

The fig wasp of the Smyrna Valley has been successfully introduced into California. Respecting the accomplishment of so significant an event the *Call* of November 11 says:—

"The most notable event which transpired in the horticulture of California during the year 1899 was the successful introduction and propagation of the blastophagus, or fig wasp, from Smyrna, Turkey

in Asia. A long line of efforts and expenditure of much money preceded this result, for upon its achievement has depended the possible dried fig industry of California. And it is now confidently expected that this fall of 1900 will bring forth and turn on the market the first crop of Smyrna figs ever produced in the United States.

The Smyrna fig is practically the only fig; in other words, it is the fig of commerce. For though there are many varieties of the ficus, yet only one holds sway throughout the world and is popularly eaten. This variety is the only one believed to require caprification in order to effect its maturity. Other figs, some of which approach very closely in its various qualities of appearance and flavour the Smyrna, particularly the white Adriatic, grow and mature without the fly; but unfertilised, the Smyrna will not grow beyond the size of mere little knots or nubbins, whereupon it dries up and falls off.

The successful introduction of the fly into California is due to the efforts of Walter T. Swingle, explorer of the United States Department of Agriculture, who visited Smyrna in 1898 and sent to his department a quantity of flies enclosed in their native capri fig. These were forwarded to George C. Roeding, an extensive fig culturist of Fresno, California, and were by him propagated, there being now on the trees of Mr. Roeding many thousands of capri figs, each harbouring the insect; all the figs passed the winter in excellent condition, and there are no fears that they will not successfully round out all successive seasons. Mr. Roeding has about 4,200 Smyrna fig trees, and flies enough to fructify about 1,200 of them.

This success has come to Mr. Roeding after many disappointments. He first began to endeavour to get the blastophagus into the State in 1892, when he sent a man to Arizona and New Mexico in search for it, there having been a report that the fly was present and doing well in that section. The report, however, proved incorrect, as it was discovered in that locality there were neither figs, flies, nor trees. The same year Mr. Roeding succeeded in getting a quantity of the blown or fly-impregnated figs from Smyrna. A part of the consignment arrived in good condition. The figs were put in among the branches of Mr. Roeding's capri trees, and many of the flies hatched and came out of the figs; but they refused to enter the California capris, and the experiment was a failure.

In 1896 Mr. Roeding received a number of the blown figs from a gentleman living in the State of San Luis Potosi, Mexico, where they are said to be thriving in numbers. Efforts were made to install these on the capri fig trees, but they also were unsuccessful. About that time Albert Koebele, a naturalist, travelling in Morales, Mexico, sent a quantity of the blown capris to Mr. Roeding from that place. Mr. Koebele intimated that he expected the flies to fail, stating that he believed that each variety of ficus had its own species of blastophagus, and if Mr. Roeding wished to succeed he would probably have to import flies from the same district from which his trees came.

In 1894-5 consignments of blown capri figs were received from

Smyrna, sent by Mr. Denotovich, of that place. They arrived in the winter season, and too early to accomplish any results. In 1898 Mr. Swingle sent his consignments. He wrapped his figs in tinfoil, each fig separately. The first consignment failed to establish themselves, but the next were successful. These latter arrived from April 1st to the 15th, and the batch comprised 30 figs in all. These were hung in the capri trees, but the flies propagated only in two figs; they came out from June 15th to July 1st. and forthwith entered other figs. The process was repeated, and in November a fourth generation of the flies appeared, coming out of over 100 figs. They entered new figs, with the result that over 500 capri figs became blown with the flies, and the transplantation or introduction of the species became an acknowledged success.

The capri fig tree and the Smyrna fig tree are two different species. The capri is a wild fig growing in the mountains of the Turkish fig-growing country, and is not fit for food. It stands to the Smyrna fig in the relation of male to female. Both figs are hollow inflorescences, the greater part of the bulb, hypanthodium, being lined with flowers. These flowers in both the capri and the Smyrna are male and female. The female flowers occupy the larger space, reaching from higher than midway the protuberance down towards the stem, while the male flowers occupy a narrow zone about the orifice or eye at the bulged end of the fruit, opposite the stem. When the female flowers are ripe this eye opens. It is then that the fly, which has, simultaneously with the ripening of the female flowers, escaped therefrom, where it was deposited as an egg by its parent, makes its way out of the capri fig, and passing through the eye scrapes the male flowers and carries away a quantity of their pollen. Once into the outer world the fly hastens to another fig, and, although the fruit may be very small, works its way in through the eye, and finding the new female flower therein deposits its eggs, one in each flower, and dies.

Thus the capri figs are really little fruits filled with flies. One fig will contain over a thousand of the things, and will be sufficient to furnish flies for a whole tree of figs. The fig growers, however, do not suffer all the flies to re-enter capri figs. They cut figs from capri trees, and putting a fig on each end of a stick they lodge it in a Smyrna fig tree. When the fly emerges from its habitat on the end of a stick it searches for a fig. The Smyrnas are the only ones about, and these it enters, bearing on its back the pollen from the male flowers of the capri fig. This impregnates the female flowers of the Smyrna, then ready to receive it, whereupon the fly dies within the fig. The female flowers then grow with wonderful rapidity, becoming juicy as they enlarge and developing an embryo which gives the Smyrna when dried that delicious and nutty flavour which so characterises it above all other varieties of figs. It is because the other figs do not have these embryos that they are lacking in taste, for when these are examined it is noted that the seeds are hollow and the fig has a flat taste, whereas in the Smyrna the seeds

are solid. It is, therefore, as a conveyer of pollen that the blastophagus is a necessity to the fig grower. And without it some years of effort have demonstrated in California that the Smyrna cannot be produced.

There are now in California on the Roeding ranch 80 capri fig trees and 4,200 Smyrna fig trees, besides other small orchards in several localities. The trees on the Roeding ranch were brought from Smyrna in 1886 by Mr. W. C. West, foreman of the ranch, who was sent to Asia for that purpose. They were procured there with extreme difficulty, the growers, learning that Mr. West was from California, refusing to sell him any on the ground that California might, if the fig were transplanted, come to be a competitor in the world's markets with Smyrna. The cuttings were, therefore, procured by strategy. A resident was engaged to buy them, which, after much difficulty, was done, the plants being shipped out of the country billed as liquorice roots, the railroad company refusing to take them under any other label. After the cuttings had got clear of the Turkish boundaries, the *Oriental Advertiser*, published in Constantinople, in its issue of December 18, 1886, printed an article deeply deploring the fact that the cuttings had been permitted to get away, and declaring its hope that "the fig may not take in California, though the chance is very slight. If it does, however, America will supply the European market with better 'eleme' than Smyrna ever produced. Another matter which should not be forgotten is that American machinery will no doubt take the place of manual labour in packing. The prospect of losing the fig trade is a sad one, and should provide food for reflection to all who live by its products in Asia Minor."

The prediction of this writer may never be fulfilled to the extent of California ruining the industry of Smyrna, but certainly this State will shortly enter the markets of the world with an excellent product of figs. A few were pollinated on Mr. Roeding's trees during the past season, and they developed into large and beautiful fruit, dried well, and carried the true Smyrna flavour. Prior to this, Mr. Roeding had been able to obtain only a dozen or so of these perfected figs by introducing pollen from the capri into them with a toothpick. Figs treated in this manner, however, matured into fleshy and full-flavoured fruit, thus demonstrating the utility and need of the wasp, a fact which, since other varieties of the fig matured here without it, was for a long time disputed in California. Even with the varieties of fig now grown in the State, embracing white and dark species, the growers have built up a considerable trade. It may be expected, however, that this will not advance after the Smyrna gets well upon the market. It would seem that the California packed figs would find a preference in the market to the boxed Asiatic product. The latter, after being taken from the trees, are pulled in the hands in process of manipulation by the packers, who dip their hands in salt water during the operation. As these packers are Turks of a very filthy caste, people living about the Aidin Valley, the section in

which the figs are grown, taboo them wholly, and eat the crated or unpulled figs, locally known as lacoom, and which are packed in bag shapes.

It is probable that the great Smyrna fig section of California will be the San Joaquin Valley, as this, of all the valleys of California, nearest resembles both in soil and climate that of Aidin. The soil must be light and sandy, and the situation hot and not overburdened with moisture. Only one crop of the figs matures annually. These appear in the latter part of June, are fertilised in July, and mature their fruit from August 1 to October 1.

The fig industry, now that it may be said to be fairly started, promises to be one of the greatest industries of California, ranking beside that of the orange. The fig is the king of dried fruits, and with this enlarged sphere of its production there must as a consequence follow a very much expanded consumption."

The Australian Vigneron and Fruit-Growers' Journal.

Fruit Pulp for England.

The United States Consul at Liverpool, Mr. James Boyle, reports to the Department of State at Washington on the large and growing market in England for American fruits, preserves and jams, and quotes from the London *Daily Telegraph* as follows:—

"Commercial journals in the United States are just now directing much attention to the vast development that is taking place in California and elsewhere in the manipulation of fruit pulps and jam, and it seems that something like a revolution in the enormous industry is by no means an impossibility in the near future. Many interesting facts are to be gleaned as to the growing part that fruit pulps from abroad are playing in the manufacture of English jams. When a single order from one noted London firm alone amounts to twenty-eight tons of apricot pulp from California, it will convey some idea of the magnitude the system is attaining. Plums, pineapples, quinces, apples and peaches are also largely utilized in this way, and the latest triumph, as it is claimed, in this direction is that of being able to send into this country strawberry pulp.

Small wonder, indeed, that the British grower has cause for complaint 'that the demand is not what it was' for his products. With the treatment of this material on such a scale it is not astonishing that those who know the climatic advantages of California for drying should advocate the carrying of the pulp preparation a step further and presenting the jam itself without the costly incumbrances of old-fashioned packing. As far as dried fruits are concerned it may be noted that South Australia is the most formidable rival in the English market of the United States, and that, in the opinion of an exceedingly competent expert, if the Australian colonies and

New Zealand would pay the same attention to packing and attractive appearance as is done in America, they would easily hold their own in this department.

At the same time it is disquieting to learn that American sweets are coming into this country at the present time in sufficient quantities to cause considerable uneasiness to our own manufacturers of these dainties. Last month's consignments of 'gum pastilles,' to be vended at a very cheap rate, to one house alone was 2,000 barrels, containing three hundredweight each, and caramels, fondants and the marshmarrow sweets which can be moulded into such quaint shapes to appeal to the childish eye are delivered at our wharf sides to the extent of 8,000 to 10,000 pounds a month. Did American manufacturers show rather more elasticity in their trade methods towards the conservative Britisher the volume of trade in this direction would be even greater than it is."—*California Fruit-Grower.*

Suggestions on Fruit-drying.

The following paper is by Mr. J. B. Neff, who read it recently at the Anaheim of the Pomological Society of Southern California:—

"In selecting grounds for drying fruit choice should be made of land that will not work into dust with the necessary walking that must be done over it, and that is nearly level or slightly sloped to the south or south-west. An acre of land will be sufficient space on which to handle 100 tons of green fruit. If large quantities of fruit are to be dried it is very necessary to have cars and track. The most convenient cars are those with cast-iron wheels 10 inches in diameter by 2 inches in face, and 1-inch gas pipe makes a good cheap axle. The car frames consist of side pieces of 3 by 4 pine fastened to the axles by 5-16 stirrups, having cross-pieces at the ends of 2 by 3 pine and a diagonal brace of 1 by 3 pine. The track rails may be of 2 by 3 pine with 1 by 4 pine nailed across the bottom to hold in place; but a better track, and one not so very expensive, can be made of 2 by 3 redwood with 1 by 4 cross-ties and $1\frac{1}{4}$-inch angle iron fastened to the inside of the rails by screws. This track is almost as good as a light T-rail track and not so expensive.

Trays: The question of size of trays is one that must be answered by each fruit-dryer for himself. If only a few tons are to be dried a tray of 2 feet by 3 feet will be convenient, but if large quantities are to be dried a tray of 3 feet by 8 feet will be found to be the most economical in every way. These should be made entirely of soft pine and free from pitch.

Sheds and Tables: A shed for cutting fruit under may be of any desired size, but one with the largest possible openings on the sides is best and coolest. This should be arranged so that the cars can be

run either through the middle, when large lots of fruit are handled, or at one side of the shed, having tray tables standing with their ends to the track.

A convenient table for holding trays is one 6 feet long by 2 feet 8 inches wide, made of 1 by 4 rails with 2 by 3 posts. There should also be a bar of 1 by 4 inches by 3 feet 8 inches long across the ends and 6½ inches from the top to set pit boxes on. These pit boxes are made of 1 by 16 boards 8 feet long and set at the sides just under the edge of the tray. Suitable stands must also be made to hold two boxes of fruit on each side of the tray and in the centre, as it is intended that four cutters shall work at one table. These tables are also convenient for small trays.

Sulphuring: Sulphur-houses may be as varied in size and form as convenience shall dictate. A very good sulphur-house can be made of a light frame covered with ordinary builders' paper to make it nearly air-tight. This should have handle bars on the sides so that two men can move it readily and place it over the trays when ready for sulphuring.

Houses: For larger drying yards permanent houses will be required. These may be built of well-seasoned redwood ceiling and 2 by 3 pine. The most convenient form is to have a separate room for each carload of trays. The house may have as many rooms as needed side by side. The rooms should be 6 feet high by 3 feet 4 inches wide and 10 feet long for 3 by 8 feet trays. There should be a transfer car to take the loaded cars from the main track and deliver them at the door of each room, which has a short piece of track to receive the car. The inside of each room must be lined with builders' paper to make it tight, and this paper should be held in place by plastering laths—a lath on the lap of the paper and one in the centre of the sheet. Cheap paper is as good as higher priced, for it can be used only one season. There will be a space between the trays and the back end of the room, where a place for burning sulphur should be made. A good way is to make a flue under the bottom of the room large enough to receive the sulphur vessel by bending a piece of sheet iron, which can be removed when the season is over. The outer end of the flue can be fitted with a piece of board to regulate draught, and the inner end must have some protection to keep the heat from coming in direct contact with the trays. The door of the room must fit close and have weather strips of cloth or burlap sacks to ensure it being nearly air-tight.

Suitable Fruit: The fruit for drying must be ripe and must not be overripe, for there is almost as much loss in overripe fruit as in that which is too green, besides making slabs and injuring the sale of the better fruit. Fruit that is in good condition for eating out of hand is right for drying. Apricots should never be picked until they are yellow throughout, and must not be allowed to get ripe enough to crush in handling.

Handling Fruit: Fruit should be cut evenly and clean, without leaving any strings to spoil the shape of the dried pieces, and placed

closely together on the tray, with the seed cup level and uppermost. Several kinds of machines have been made for pitting apricots, but so far nothing has been devised that can do the work of careful hands; and it is scarcely likely that such a machine can be made. There are, however, machines which do fair work on small fruit which is not overripe.

Bleaching: When the trays are full they must be removed to the car and kept under cover until enough is pitted to fill a sulphur-room, but in no case should the fruit stand more than an hour before beginning to bleach. When ready to begin the bleaching run the car into the sulphur-room, taking care to leave as much space as possible in the farther end of the room, and close the door.

Only the best quality of sublimated sulphur should be used. The practice has been to use too much sulphur in bleaching, and as much as fifteen pounds per ton of green fruit is often used. This is waste, and worse than waste, for it spoils the flavour of the fruit. From three pounds to five pounds to the ton of green fruit is all that is required if the houses are made as they should be, and this quantity is scarcely noticeable on the fruit.

An iron pot of about 8 inches in diameter and 4 inches deep is the most convenient vessel in which to burn sulphur, and by regulating the draught at the mouth of the flue and at the top of the door the sulphur can be made to burn any desired time up to ten hours. About four hours is long enough to keep fruit in sulphur fumes in the coast regions, and a shorter time will do equally well in the interior. This can be determined only by experience, as what is wanted is to have the whole fruit bleached so that it will be transparent and dry flat without curling up at the edges. If the skin is not bleached it will curl up and make the dried fruit small. It must be remembered that it takes almost as much sulphur to bleach one tray properly as is required to bleach all that the room will contain.

Pears require a much longer exposure to the sulphur fumes than most other fruit, so that it is necessary to arrange for very slow burning of sulphur when bleaching these.

When the fruit is ready to leave the sulphur-house the trays should be spread on the drying ground at once, with a passage-way between each row of trays.

As soon as the fruit will bear moving without losing its shape it should be loosened from the trays, and all the fruit of five trays placed on one tray. This can be done readily by taking the trays in groups of five and turning two from each side into the middle tray. This tray should then be covered with an inverted tray, and allowed to stand until all the fruit is cured. This can be determined by handling the fruit, which should be soft and pliable to the touch, but not sticky. The fruit should never be dried hard enough to rattle on the trays.

Grading and Packing: After the fruit is properly cured it should be run through a grader, and each size placed in a separate pile in a tight room, having screens over the ventilator to prevent the entrance

of moths. It is best to fumigate the storage-room each season bafore using. The fruit should be packed in boxes for shipment to market, and in order to get the best return and the most money for the grower must be handled by associations connected with a central exchange."

Growing Flowers for Perfume.

Under the above heading appears in a recent number of *American Gardening* an interesting article on flower-growing in the South of France. The total area devoted to this industry is nearly 1,800 acres, of which Nice has 500 acres, and Cannes, Mentone and Grasse each 250 acres. In this area there are annually treated 4,400,000lb of roses, 5,500,000lb. of orange blossoms, 440,000lb. of jasmine, 330,000lb. of cassia, 330,000lb. of tuberoses, 440,000lb. of violets. More than one million pounds of pomades or perfumed oils, and one million gallons of floral waters, are annually manufactured.

The beautiful city of Grasse, the centre for perfume flowers of the entire world, has for several centuries been the home of an extensive, interesting, and very picturesque industry. The cutters, women and children, at daybreak, before the rays of the sun have fallen upon the flowers, assemble, and to the rhythm of their songs perch upon the trees or stoop beneath the bushes to do the gathering. The cut flowers are put into bags and carried to the works, where they are received by girls, who sort them and spread them out upon the pavement of a cool hall, where the manipulator comes to get them.

There are two sorts of flowers—those in which the perfume exists entirely formed before beginning to evaporate, and those in which it is gradually produced a few moments only before it is disengaged. Such differences are easily observed. If one rubs the petal of a rose there will remain upon his fingers a very distinct odour of the flower; but if he rubs a jasmine, he will have the disagreeable scent of decaying verdure. Hence arises two distinct methods of treatment. The flowers that readily give up their odour by rapid and violent means are treated by distillation, while the others require a slower and more delicate process, the use of a solvent. This is a mixture of beef suet and lard, washed, melted, and prepared with the greatest care. It may be replaced by very pure olive oil, or highly-refined neutral oil. When performed in a warm way it is called maceration; in the cold, absorption, or enfleurage.

There are only two flowers that will withstand distillation—the rose and the orange flower. Twenty-five gallons of water and about 110lb. of flowers are placed in a still, and heat is applied. The boiling water disorganises the cells containing the essential oil, and sets the latter at liberty. The vapour condenses in a cool worm, and the water and essential oil are collected in a Florence flask, wherein

the difference in density separates them. The stills are double bottomed, and heated by a naked fire or steam.

In the process of maceration women stand in front of a water-bath stove, and melt the fat in tinned basins, called "burgadiers." Into these they throw the violet, cassia, jonquil, rose, or orange flowers, and keep them submerged by means of a spatula, at a temperature of 65deg. C. for half an hour. Then they take them out and drain them, and pass the combined residue, heated by boiling water, into a hydraulic press, in order to remove the last traces of fatty matter. A single maceration does not, however, suffice to perfume the fat, which is so far scarcely odoriferous. The workmen then take this same fat, recharge it with flowers, and begin the operation anew, and proceed until the fatty body has acquired the desired strength. It is estimated that it takes about 5lb. of flowers to perfume a pound of fat. With certain flowers, 25 treatments are required.

The enfleurage process is employed for the jasmine and tuberose. At first the flowers are carefully weighed in a basket, and transferred to the table, around which are standing women, each with wooden frames furnished with glass bottoms. The upper surface of the glass is spread with a layer of fat by means of a spatula, and upon this the flowers are directly laid. The frames are arranged in piles of 40, one upon another. The flowers are thus enclosed between two frames, which form a small, close, cool chamber, in which the aroma develops, under the best conditions possible. The next day the flowers are replaced by fresh ones, and so on until the pomade has acquired a sufficient strength of perfume. In order to manufacture perfumed oils use is made of frames, in which the glass is replaced by wire gauze, upon which rests a piece of wool saturated with oil. The perfumed oil is collected by pressing all the pieces of wool.

The process is very lengthy, and, with the jasmine, takes three months. Moreover, it is very expensive, on account of the material it requires. The smallest establishment possesses 4,000 frames, and large works 40,000. They are 3in. in depth, 24in. in length. One frame, in fact, cannot support more than 15oz. of fat, and one piece of woollen more than 2lb. of oil.

For the manufacture of alcoholic extracts of the perfume, the flower pomade is introduced with a suitable quantity of alcohol into a shaker, consisting of a cylinder, in which a screw-beater is kept going all the time. The mixture is thus actively beaten up, and as the perfume has more affinity for the alcohol than for the pomade the former is charged with the greater part of the perfume. The alcoholic extract is then drawn off, and the pomade sent to the soap-maker. To remove a small portion of the pomade, which is dissolved in the process, the alcoholic extract is cooled by means of ice, or by an apparatus arranged for effecting the congelation of the extract, the decanting under pressure, and the cold filtering out of it. Then it is blended, aged, bottled, capped, labelled, tied with fancy ribbon, and finally boxed.—*Australasian.*

American Roses.

The *Gardeners' Chronicle* of January 5th refers to a statement made in a daily paper of January 2 concerning some American-grown roses. It says :—"Perhaps the most pleasing gift that came to the Queen at Christmas, among the myriad tokens of love from all parts of the world, was the box of magnificent Queen of Edgely roses from Philadelphia. The roses were a feature of the decorations at Osborne, and they are still bright and fresh, though more than a week has passed since the *Lucania* brought them to Liverpool, as was then related by the *Express*. It took no less than two years to produce the twelve magnificent roses presented to the Queen on the last Christmas of the century. Two years ago, when the British Horticultural Society held an exhibition of roses at Buckingham Palace, Her Majesty graciously asked Mr. David Fuerstenberg, a veteran rose-grower, of Philadelphia, what he, an American, thought of the English roses. He replied that they were very pretty, but that everyone grew better roses in the State. He pointed out that the flowers were small and the stems short, whereas in America great roses were shown with yard-long stems. Her Majesty expressed a preference for fragrance and delicate loveliness rather than for size and length of stem, but said that she would like to see the gorgeous American roses. The American, on his return home, began experimenting in order to produce the finest roses ever grown, and also to discover a method of preservation certain at least for 12 days. After 24 months he accomplished both ends, and sent the dozen promised roses in charge of a famous London florist on the Lucania. The roses are superb, being 8in. in diameter, and having stems a yard long. The large blooms are shaped like the American Beauty, but are a bright pink colour. The precious flowers arrived in perfect condition. The ends of the stems were placed in long glass phials filled with water, and capped by rubber, fitted closely around the stem. The opened buds were then wrapped up in waxed paper to exclude the air, and then the roses, stem and all, were buried, each by itself, in soft moss damped and packed in cracked ice. The box of roses was then sealed in a strong box and placed in the *Lucania's* cold storage room. When the box was opened, it was found that the buds had burst into full bloom, and were entrancingly fragrant and beautiful. They were consigned to the Secretary for Foreign Affairs, who saw that they were safely delivered to Her Majesty. Thus it was that the loveliest and largest roses in the world came to the Queen (and to the *Gardeners' Chronicle*) at Christmas." The *Chronicle* did receive a box of roses at Christmas from Philadelphia, but all the petals fell away when unpacked.—Editor.

Return of Fruit Exported

DURING THE MONTH OF FEBRUARY, 1901.

Variety of Fruit.	No. of Packages.	Quantity. Lb.	Number.	Declared Value.		
				£	s.	d.
Grapes ...	1,729	36,638	...	832	11	6
Peaches ...	2,409	...	60,000	482	19	0
Plums ...	1,209	...	38,700	173	8	0
Pears ...	709	...	18,740	148	6	6
Apples ...	152	...	20,750	80	15	0
Nectarines ...	434	...	12,814	49	0	0
Lemons ...	1	...	25	0	7	6
Totals ...	6,643	36,638	151,029	1,767	7	6

MISCELLANEOUS.

The Harmfulness of Bush Fires.

We are indebted for the appended paper, Pamphlet Series, No. 4, on the above subject to the courtesy of Dr. Morris, Commissioner of the Imperial Department of Agriculture, West Indies.

In his preface Dr. Morris remarks:—

"The following pages contain an interesting paper on the "Harmfulness of Bush Fires" read before the late West Indian Agricultural Conference by Dr. H. A. Alford Nicholls, C.M.G., well known as the author of "Tropical Agriculture." To the paper is added a summary of the discussion that took place at the Conference. The latter affords additional information and will, it is hoped, lead to a wider appreciation of a very important subject.

It is established that the careless use of fire has largely contributed to destroy forest growth all over the West Indies. The

bare, brown and barren appearance of the lower slopes so characteristic, especially of the northern islands, is due to the fact that the original forest has been cleared, the soil exhausted and afterwards abandoned. Directly seedling trees and small growth show themselves and there is a chance of the land being again covered with forest, the cutlass and the fire stick once more appear, and everything is reduced to ashes. This process continually repeated has not only destroyed the vegetation, but has also gradually altered the climate. Without shade the ground hardens, moisture rapidly dries up and springs and streams diminish.

In clearing land for permanent plantations, the question has often been asked: Is fire necessary in all cases? In clearing light forest, or secondary growth, it is admitted fire is not necessary. It would be better to dispense with it altogether. On the other hand, in heavy woodland, or in virgin forest, in moist districts, the use of fire is not only necessary, but essential before the land can be suitably brought into cultivation. The aim should be not to prevent the exceptional use of fire in clearings under proper control, but to put a stop to the general desolation and waste caused by "bush" and "grass" fires and prevent serious injury by the careless use of fires to established plantations, especially during the dry seasons."

The following is the paper :—

"I have been asked to read a paper at this Conference on Bush Fires and their harmfulness to the soil and to vegetation in those islands in which they are not controlled by legislative enactment.

The subject is one which has engaged attention for some years past, and I have spoken and written a good deal about these fires and their harmful effects in those West Indian Colonies in which they are allowed to rage without interference. It follows, therefore, that most of what I have to say to you has been made public by me elsewhere in some form or other.

Nowadays, however, it too often happens that useful legislation is delayed until its necessity is brought home to the Government and people by frequent discussions, by the reiteration of arguments, and by the constant statement of facts bearing on the subject. This, I hope, will be the last effort that will have to be made to bring about the much needed legislation to control bush fires, for I trust that the discussion which will follow the reading of my paper will crystallize the facts into such a concrete form as to allow the question to be dealt with satisfactorily by the various Governments concerned—the Imperial Departmeut of Agriculture of course assisting by its advice and, if necessary, its initiative.

It may be well, perhaps, for me in the first instance to state briefly what steps have already been taken to bring the question before the public. In July, 1899, after a certain amount of discussion and correspondence, I raised a debate in the Legislative Council of Dominica on the destruction caused by bush fires in the island, by moving the following resolution :—

Whereas it is the custom during the dry season for peasants and others to clear lands by setting fire to dry grass and brush thereon;

Whereas in many instances such bush fires having escaped control have run on to cultivated and forest lands, causing considerable destruction and entailing great loss to planters as well as interfering with the progress of the Presidency towards prosperity;

And Whereas such fires, by destroying seedling indigenous trees, prevent the reafforestation of the waste lands on the leeward side of the island, thereby causing these lands to remain barren;

Be it Resolved.—That, in the opinion of this Council, it is desirable to empower the Governor by legislative enactment to issue his proclamation in times of drought forbidding for certain periods, under severe penalties, the setting on fire of any lands whatever, unless in special instances permission in writing be given by an authorized official.

This motion gave rise to an interesting and instructive debate, during which the harmfulness of bush fires was borne testimony to by the Councillors, some of whom detailed the destruction worked by fire on their own properties. The resolution, I am glad to say, was passed unanimously by the Legislative Council, but the Government has not yet introduced a draft Ordinance to deal with the question. Afterwards the West India Committee communicated with me on the subject, informing me that they had requested their correspondents in Antigua and St. Kitts to do what they could to get a similar resolution passed in the Legislature of those islands. Later on, the Governor of the Leeward Islands, in an address to the Antigua Council, pointed out the necessity of counteracting the evils caused by bush fires in the country districts; and there has been, I understand, some official correspondence on the subject with the Secretary of State for the Colonies. It had been decided that I should bring the matter before you at the last Conference, but I was unable to attend the meeting, and, as no definite action was taken by the local Government, I read a paper on the subject at a meeting of the Dominica Agricultural Society on May 30 last year, not only in order to keep the matter before the public mind but also to prepare the people for the promised legislation. This meeting was presided over by Mr. Bell, the Administrator of Dominica, who during the discussion admitted that I had "made out a good case for legislation." A similar resolution to that passed by the Legislature was then adopted by the Agricultural Society, and a copy of it was subsequently forwarded to the Government. Such, then, is a brief account of what has been done in the Colony of the Leeward Islands towards the solution of the question, and I now bring the matter before this Conference. I understand, however, that there are Representatives here from Colonies in which legislation to control the mischievous effects of bush fires has been in force for years, and I hope that these gentlemen will bring forward facts to show the usefulness of such legal restraint.

In the West Indies and elsewhere in the tropics, under the

generic term of Bush Fires are included all those conflagrations both great and small, whether caused purposely or accidentally, that destroy the vegetable products of the soil. They may be divided into five classes as follows :—

1. The fires deliberately set to burn down plants growing on limited areas with the object of destroying blights that are troublesome or are likely to become epidemic.
2. The fires sometimes made to the windward of cultivated lands affected by insect blights, so that the dense smoke may kill or drive away the pest.
3. The "burns," when high forest is cut down, the trees lopped, and fire is used to destroy the immense encumbering mass of wood so as to render the ground sufficiently clear for cultivation.
4. The "grass fires" that are set in dry seasons to destroy dry rank grass in order to induce a new and tender undergrowth for the grazing of cattle or for the grass-cutter's knife.
5. The ordinary "bush fires" of Dominica and other mountainous countries, by means of which the soil is cheaply and expeditiously cleared of brush and weeds, cut down or hoed up, on lands intended to be put into cultivation.

The first class of fires is simply a method adopted in the treatment of diseased plants, and is one of the heroic remedies of the plant physician when he endeavours to stamp out a dangerous epidemic. Such a remedy, however, is never used without careful precautions being taken to prevent unnecessary damage.

The second class of fires differs from the first in that the cultivated plants are not destroyed. The plan is frequently employed in some countries to rid plants of insect pests which are readily killed by the acrid smoke of burning green wood, bush and leaves.

The third class of fires is seen only in forest clearings, where it is made use of to remove the massive tangle of fallen trees that encumber the ground. In the early years of settlement in the West Indies, when the islands were covered with primeval forests, these "burns," as they used to be and still are called, were part of the systematic work of all planters. Laborie, in his well-known work entitled *The Coffee Planter of Saint Domingo*, published in 1797, gives particular directions as to the proper way in which the forest trees should be felled, and the branches lopped and strewn, so as to get what he describes as a "good burn" that will clear the land sufficiently for commencing cultivation. It is worthy of remark, however, that even this far-seeing writer, who penned his words over a century ago, deplored the destruction of certain constituents of the soil by these fires, and said "it is to be wished that burning could be dispensed with." Forest burns are now to be seen only in Dominica, St. Lucia, Trinidad, Jamaica and other islands in which there are still tracts of virgin forest; and, as such fires are essential and not fraught with dangerous consequences if due care be taken to prevent the conflagrations spreading, it is unnecessary further to

consider them than to point out that legislation should not prohibit them, but should impose an obligation on the planter to prevent destruction of standing forest around the clearings.

The fourth class, or grass fires, is frequently seen in all the islands, more especially in dry districts. As I shall later on have occasion to show, these fires—which often take place every dry season on the same ground—are disastrous in their ultimate effects, and the crop of fresh grass that springs up after them does not compensate for the evil worked.

The fifth class comprises the ordinary and well-known bush fires of the tropics. They are especially common in Dominica, and, in the dry season, they may be observed in that island in all directions. Indeed, not only the peasants but also many proprietors of large estates invariably employ this wasteful method of clearing land for cultivation. The advocates of the system say that the fire gets rid of the brush and weeds expeditiously and cheaply, and some say that it also does lasting good by destroying the harmfnl insects on the soil. It may be conceded at once that vegetable matter is removed most easily by fire, and if the removal of this matter were the only consideration no voice could be raised against bush fires. But a serious question has to be answered in the first instance, namely, is this vegetable matter in the form of leaves and brush of so little use to the land and the planter that its destruction is desirable? And, following on this question is the equally important one, does the planter gain or lose by converting all this organic material into inorganic matter in the form of ashes? Both these questions I hope to answer in such a way as to show that the clearing of land by fire is the worst and most wasteful system that the planter could adopt I would pause here, however, to say a few words about the erroneous idea that, in consequence of fire having been passed over the land, there is likely to be a long immunity from the depredations of insects for the reason that all of them have been destroyed in the burnt area. Now, most insects, like the higher animals in a state of nature, wander about in search of food. They are kept in check by natural laws, the chief of which is the struggle for existence. And it is futile to expect that a circumscribed area can be kept free from insects by passing fire over it, for, as soon as fresh vegetation springs up on the burnt land, the insects will find it out and come in from all sides, so that in a short time the insect population of the patch will be as numerous as it was before the fire was set.

The harmful effects of these bush fires on the soil may be thus tabulated:—

1. They destroy nitrogenous matters that would have gone to enrich the soil by the natural decay of the brush and leaves.
2. They destroy a certain proportion of the nitrogenous matters already in the upper layers of the soil.
3. They destroy the nitrifying microbes in the upper layers of the soil.

4. They sterilise the upper layers of the soil and thus for a time prevent the fixation ot nitrogen for the use of vegetation.

It may be roundly asserted that in all cultivated soils in the West Indies there is a deficiency of nitrogenous constituents, which deficiency is usually attempted to be made up by the digging in of plants, more especially those of the pea family, grown on the land for the purpose. It is therefore most essential that the planter should do everything possible to add to his soil all the vegetable matter he can get hold of, so that by its decay it may increase the deficient nitrogenous constituents. And yet it is the custom in Dominica and elsewhere to destroy these most valuable organic materials by fire, instead of turning them into the land to repay the expense and labour of so doing over and over again by the resulting increased crops and finer produce. Indeed, as I have said elsewhere, "To prevent the peasant from destroying what is necessary for the fruitfulness of his land, is to do him good by ensuring larger crops from his holding. Thus it is advantageous to the country generally that this wasteful destruction by fire of important constituents of the soil should be put an end to." Agricultural chemists tell us that every pound of nitrogen in the soil has a definite value which may be expressed in figures. Were it possible to calculate the annual loss to planters on the basis of the money value of the nitrogen robbed from the soil annually by the bush fires, the total amount would be astounding.

But these bush fires not only destroy the vegetable matter intended by nature to enrich the soil, but they burn or bake the upper layers of the land, and this means that not only does the heat of the fire volatilize the nitrogenous matters already prepared in the soil for the assimilation of plants, but that it also destroys the nitrifying microbes that are constantly at work to produce the rich organic material for further plant food. Thus it seems that fires on lands, especially in these countries, are utterly disastrous in many ways, that they cause a diminution of the quantity of the produce got from the soil, and therefore deleteriously affect the fortunes of the planters and consequently the prosperity of the country.

To prohibit these fires entirely would be to prevent peasants and others from destroying what is necessary for the fruitfulness of the land, and so it would be sound political economy. But political economy and "the liberty of the subject" are sometimes contradictory terms, as in this instance, in which a man is held to have as much right to destroy the fruitfulness of a certain portion of the land as he has to pull down his house. But he must confine the destruction to his own property and not injure his neighbour's. Were these bush fires always limited to the circumscribed areas being cleared for cultivation there would be less to be said against them, and it is questionable whether in the present state of public opinion repressive legislation could be suggested with any chance of its adoption. But by carelessness, by ignorance, and sometimes with malicious intent the conflagrations spread over and ravage large tracts of land, thereby destroying much valuable property.

The devastation caused by bush fires in Dominica alone is enormous, and it is undoubtedly a serious drag on the prosperity of the island. During the dry seasons the fires may be seen in all directions along the coast, in the valleys and on the hills. The absence of all control has rendered the people quite reckless in regard to them. If a peasant has to clear a few square yards of land to plant some "ground provisions," he will set fire to the dry brush in the afternoon and then gaily go home without troubling as to where the fire may run to. A fire set in this way in Dominica not very long ago near to the sea, spread to neighbouring lands and produced a conflagration that raged for days, running up a wide valley, destroying everything in its path, and then reaching and seriously damaging cane and lime plantations on the hills. Dominica planters will tell the tale of how their cacao and other plantations have been greatly injured and the crops ruined by fires carelessly set in contiguous peasants' holdings; and they will tell also how their woodlands have been destroyed by similar fires. Indeed the losses due to these constantly recurring fires have become so great that legislation is urgently needed. If the matter were carefully inquired into, it would be found that, year by year, an increasing extent of land is being rendered barren by bush fires. As an illustration of the correctness of this statement I may bring forward the following facts concerning certain districts along the leeward coast of Dominica. Many years ago there were thriving coffee plantations on these lands, but now they are barren wastes of rocks covered in places with a thin skin of soil. During the wet season rank grass and weeds spring up from seeds dropped by birds or blown by the wind. Were the land left to itself, by the operation of natural laws soil would accumulate and seedling trees would grow and increase in number and variety, and, in a comparatively short time in our West Indian climate, a "secondary forest would result, and then, by the judicious felling of a portion of the wood, the land could be gradually brought back to cultivation. But what really happens is that most of these waste lands are subjected to the ravages of bush fires every year, the seedling trees are killed out and the soil is left burnt and bare with no live roots ramifying in all directions to hold its particles together, so that, when heavy rains come, the loosened surface soil is washed to the valley or sea, and nothing but a rocky barren waste remains. This disastrous destruction of a cultivable soil has been going on for years and years in many islands in the West Indies, and it has resulted in the conversion of former fertile districts into barren wastes in Dominica, Montserrat, Antigua and all the islands to the north. It has not only made deserts where there should be gardens, but it has actually in places produced a disastrous effect on the climate. Mr. Watts can tell you of the evil effects of bush fires at the northern end of Montserrat and throughout Antigua. And I doubt not that many here can bear testimony to the fact that I have not over-estimated the urgency of the question.

In Dominica there is a dry barren district known as the Grand

Savannah, and years ago the late Dr. Imray endeavoured to reclaim a portion of it by planting poung Ceara rubber trees on it in all directions. The plants grew well and there was every hope that this barren waste would have been brought into remunerative cultivation, and that a new industry would have been established in the country; but unfortunately, the bush fires set by the peasants in the dry season swept over the plantation and killed out the rubber trees planted with so much care and expense. A similar attempt made later on to plant up portions of the Grand Savannah met with the same disappointing result, and it is clear that nothing can be done in Dominica to reclaim such barren lands until by legislative enactments the people are prevented from causing these extensive and disastrous conflagrations.

Legislation is also undoubtedly greatly needed in many of the other islands to abate the evils caused by these bush fires. It would not be advisable now to prohibit all fires on lands, but, without delay, an end should be put to the system whereby every person can at any time with impunity set fire to dry grass and brush and so produce a conflagration that may and often does cause great injury and loss to his neighbour's property, and that certainly retards the prosperity of the country. Although bush fires need not altogether be prohibited, they should not be allowed to be set in very dry seasons as they are then exceedingly dangerous; and, at other times, they should be so regulated that the evils I have brought to your notice may be mitigated if not entirely abolished.

Discussion.

The President: Dr. Nicholls has placed before us an important subject in an able manner. In every tropical country with rank vegetation the regulation of the use of fires, especially during dry seasons, is essential to its agricultural progress. I had already furnished Dr. Nicholls with extracts from Laws in force in Ceylon, Mauritius, Cyprus and Jamaica. We have therefore ample precedents for taking up the subject. It is within the experience of everyone present that great injury is done in these islands both to the yearly diminishing forest areas as well as to cultivated lands by the careless use of fires. As guardian of large stretches of Government forest lands in Jamaica from 1879 to 1886, I was directly concerned in enforcing the provisions of the Law (25 Vic. cap. 30) "to protect Property from the careless use of Fire" in that Colony. The difficulty I experienced then was to detect the source of a fire and find out the person actually responsible for it. To solve this, I suggested in 1885 that every man who intended to set fire to his clearing, large or small, should be compelled to give notice beforehand to his neighbours and also at the nearest police station, so that if the fire escaped, the person responsible for it could be easily traced. I deprecate hasty action, and would suggest that to-day we confine ourselves to facts within our observations and so convince those, who have not hitherto realised the injury done, of the

necessity of preventing a continuance of it in the Colonies in which they are directly interested.

Mr. Fawcett (Jamaica): As Dr. Nicholls has pointed out, there are a good many reasons which induce people to set fire to bush and grass lands, as in many cases is necessary. The question, however, is whether these fires cannot be so controlled as to do the minimum amount of harm and the maximum amount of good. In Jamaica hundreds of acres of good pasture land have been devastated and impoverished by the peasants setting fire to it in order to pasture their stock when the green grass springs up. In one district, proprietors have begun to fence in their land so as to prevent cattle from straying, and, in consequence, fires have diminished, and young trees are springing up. The existing law in Jamaica has been enforced in the Blue Mountains to some extent, but I do not think it is really of very much use, because when a peasant rents an acre of land from the proprietor he has to clear off the bush before he can cultivate his land, and the only way to get rid of that mass of vegetation is by burning. In most cases every precaution is taken to prevent the fire spreading to the neighbouring woodland, but, unfortunately, it often passes over the boundary line and considerable damage is done. In such cases the people have been brought before the magistrate and fined, with the result that they are now more cautious. There will, however, always be fires. In many cases proprietors set fire to their own grassland to destroy the ticks, as this is, in their opinion, the only way of getting rid of these pests. In other cases when Guinea grass has been grazed and only the valueless part is left, the proprietors set fire to it. We have thought of legislation in connection with these bush and grass fires, but I think it will be difficult to formulate any scheme which will be generally applicable. Perhaps, if care were taken to see that the police regulations, already existing against the careless use of fire, were carried out, and the police insisted on notice being given by the peasantry and others when they were going to use fire, some good might result.

The President: I should like to ask Mr. Fawcett whether specific instructions have been issued by the Government of Jamaica to protect the forest still existing in that Colony from injury by the careless use of fire on neighbouring areas?

Mr. Fawcett: I do not know whether instructions have been issued of late, but in my opinion the Government should not allow any of their forest land to be let to tenants.

Mr. F. Watts (Antigua): I am not sure that we have a sufficiently sound public opinion on this subject of forest and pasture fires in order to have useful legislation. I can support all that Dr. Nicholls has said with regard to the damage done by these fires in the West Indies generally. They would cease if those who are responsible for them recognised the loss they entail. I may refer to one form of bush and pasture fire which is disastrous in Antigua. A great deal of the island, which was originally cultivated but now abandoned, is covered with coarse pasture grass which is not eaten by the cattle

after it has flowered and which is therefore useless. When burnt down, however, the new grass which springs up is eaten by the cattle, so that there is a distinct inducement on the part of peasants and proprietors to fire the old grass in order to get pasturage for their cattle. On remonstrating with the people and showing them the great loss which ensues on the burning of large quantities of nitrogenous matters, they reply that they get the ash, and seem to be unaware of the fact that the ash will always be there. When knowledge on this question spreads, and we have a sound public opinion, we shall very soon get legislation. But if legislation is imposed before public opinion is ready for it there will be all sorts of grievances and all sorts of attempts to evade the law. Probably much more good will be achieved by thoroughly discussing and ventilating the subject. The matter is a very important one, as it bears upon the question of the reafforesting of waste lands. This aspect of the question does not strike one in Antigua so forcibly as it does in St. Kitts and Montserrat, where the efforts made to reafforest the hillsides are thwarted by the grass fires of the dry season. Then there is the question of firing the grass in places like Jamaica to kill ticks, where it is said to be the only method of keeping the cattle free from these pests. I am not convinced of the efficacy of such fires and I should like to hear the arguments on the other side. I am confident that in Antigua the tick pest can be combated by other means than burning, but whether this is possible in the hilly country of Jamaica, I do not know.

Mr. Sharp (Jamaica): I have been struck by the remarks of Mr. Watts with regard to the tick pest. In Jamaica, not long ago, we obtained the services of a specialist, the late Professor Williams, to report on the tick pest there. Our experience is that we do not get rid of the tick by burning the grass. As soon as a grass field is set on fire, the female tick burrows into the ground and conceals herself among the roots of the grass. The fire passes over the field destroying what we call the grass lice, or young ticks, but it does not affect the female. The latter comes to the surface again and deposits her eggs. As soon as the grass is sufficiently high for the cattle to be turned into it, the ticks are there again. I have given much thought to the question of fires and I cannot discover any real necessity for using them. I can understand that in the cultivation of tobacco or cacao, there may be some excuse in using fire so as to get rid of pests and weeds cheaply, but when we compare the small profit with the serious damage done in instilling into the minds of the people the idea that the saving by burning is equal to the labour which would be expended in otherwise clearing the land, it is our duty to endeavour to stop the use of fires entirely. I know of no place where forest and other fires are more prevalent than in Jamaica. My experience leads to the conclusion that the only way to stop them is by legislation prohibiting their use or allowing them only under certain conditions, and on the recommendation of the proper authorities. To show that such legislation would be efficacious, I may

mention that some time ago, a serious fire, causing a considerable amount of damage, occurred on one of my plantations, the origin of which was traced to the carelessness of a man who had been cooking breakfast under one of the trees, the root of which took fire. I prosecuted this man for careless use of fire and he was convicted and sentenced to six weeks' imprisonment, the judge remarking that it was his intention to deal similarly with any person who was charged with a like offence. The remarks of the judge had a very wholesome effect, and further notices were issued threatening prosecutions for the careless use of fire on plantations. Thereupon the fires diminished in number and we passed through a severe drought without serious difficulty. I challenge any agriculturist or scientist to prove that there exists any necessity whatever for the use of fire in the cultivation of the ground, not only from a financial point of view but from the view of improving the conditions around us. One effect of these forest fires in Jamaica has been to prevent certain proprietors from renting their lands to tenants, and consequently there are large areas that are not cultivated and from which the proprietors reap little or no benefit. I have had the advantage of living in various parts of Jamaica, and I must say that if there is a subject which requires urgent legislation and one which this Conference could usefully take in hand, it is the question of these fires. Personally, and on behalf of the Jamaica Agricultural Society, which I represent, I offer my congratulations to Dr. Nicholls for the very able and lucid manner in which he has dealt with this question.

Mr. Fawcett (Jamaica): Harm is done to a good cause when the argument is pushed too far. I am not certain if Dr. Nicholls has gone too far, but I am sure Mr. Sharp has when he states that fires are altogether unnecessary in cultivation. In reply to him I would point out that on certain clay soils in England the grass is cut and burnt in heaps, and the texture of the soil is thereby improved. Legislation is not a cure for every ill, and in this particular matter much depends on the people and especially on the large proprietors. I know of one proprietor who has gone to considerable expense in stopping the evil, and I feel sure that if the proprietors in woodland districts insisted on their tenants remaining on the already cleared lands, and prevented them from moving from place to place, the result would be beneficial.

Mr. Sharp (Jamaica): I am glad to find that Mr. Fawcett in replying to my remarks has confined himself to his experience in England.

Mr. Jordan (Montserrat): Bush fires are a serious matter in Montserrat. The island suffered severely from the hurricane of 1899, when nearly all the trees were blown down. Since then efforts have been made by the people to clear the mountainous districts, and I know of an instance where nearly a square mile of forest on the mountain side was destroyed by a fire set by a peasant to clear an acre of rented land. The young growth from the trees which had been blown down by the hurricane was destroyed by this fire, and during the rains the soil was washed down from the slopes. I have

experienced great difficulty in persuading the peasantry to stop these fires as they say the ash is of value. I do not think *all* fires should be stopped, because in Montserrat this is the only means, for instance, of getting rid of Para grass. At the same time, I know that estate owners are anxious to stop forest fires, but the people will not rent land from them unless they are allowed to clear it by burning the fallen trees. I feel sure that if legislation on this question were adopted and enforced, the people would cease burning the forest.

Mr. D. McDonald (Antigua): The able paper read by Dr. Nicholls is particularly interesting to us in Antigua, where the subject of fires has been lately discussed. Some time ago Mr. Watts read a paper on the subject to the Agricultural Society, when it was decided to discuss the paper later on with a view of eliciting an expression of public opinion preparatory to legislation. It will be evident therefore how welcome any discussion at this Conference will be in Antigua, and how valuable will be the remarks of those members from other islands where legislation on bush fires already exists.

Mr. Hudson (St. Lucia): In St. Lucia the large proprietors are inclined to prohibit the use of fire entirely; but I do not think its use should be totally prohibited by legislation. In my opinion permission should be obtained from the proper authority, and competent men might visit the localities where permission is asked for. The annual expense incurred would be from £100 to £200, which would be repaid by the saving effected. With regard to fires in clearings I can say, after fifteen years' experience, that it is absolutely necessary to burn forest land if cacao, coffee, limes or ginger are to be cultivated. I fully appreciate all the disadvantages attending the practice, but I have always found it necessary in clearing heavy forest growth.

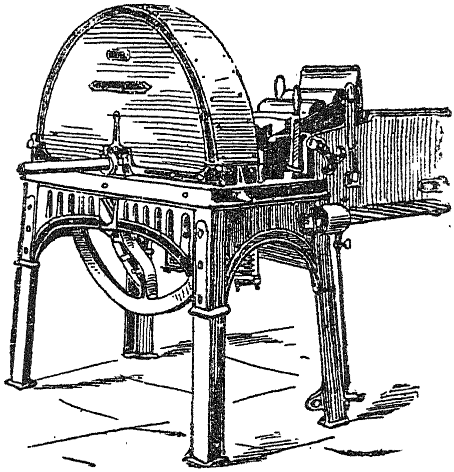
Mr. Louis Bert de Lamarre (Trinidad): It would be much better if it were possible to do without using fire, but in places like Trinidad, where cacao is cultivated, fires are considered necessary in first clearing the bush. Before fire can be used, however, a license has to be issued by the Warden of the district, and security has to be given by the applicant by clearing a space around the area to be burnt twenty feet wide.

The President: Very diversified opinions have been expressed on this important subject, showing that it requires further consideration. There appears to be a misconception as to what is, and what is not, a legitimate use of fire in agricultural operations. In Jamaica the law referred to imposes penalties on the careless use of fire so long as it actually causes loss to property. The law is there, but it is perfectly useless unless enforced as instanced by Mr. Sharp. Forest lands belonging to absent or careless resident proprietors may still be burnt with impunity. On established plantations the injury, when it occurs, is more apparent and is usually dealt with. We come next to the use of fire in clearings for coffee, cacao, &c. If it could be managed, I should like to see the use of fire absolutely prohibited; but where there is heavy tropical forest, and where, after the trees are felled and lopped, there is a pile of vegetation several

feet in depth covering the land, I fear it is impossible to get rid of this without the use of fire. But in all such cases the greatest precaution should be taken to prevent the fire from spreading. As in Trinidad, a license should be required beforehand (or due notice should be given to neighbouring proprietors and at the nearest police station as suggested at Jamaica), and in every instance an open space of, say, 20 or 30 feet be made all round the clearing. The periodical burning of pasture, or so-called waste lands, either by acccident or design, is a ruinous process, and every effort should be made to stop the practice. I trust that during the next twelve months members of the Conference will carefully study the subject, and also bring it before the local Agricultural Societies in order to have it thoroughly ventilated and ripened for future action. There is evidently a good deal to be done everywhere to guide and enlighten agriculturists in regard to the economical and judicious use of fire.

Dr. Nicholls (Dominica): There are one or two points I should like to clear up before the discussion is closed. Firstly, I would point out that both Mr. Hudson and Mr. Bert de Lamarre seem to have misapprehended or did not hear what I pointed out in my paper, that in clearing heavy virgin forest in the West Indies the only means of getting rid of the woody material is by fire. Unfortunately the fire destroys a good deal of nitrogenous matter, but still there is no other means of getting rid of the fallen trees and débris. In Dominica a very large extent of forest land has recently been cleared in this way with the object of establishing a coffee plantation. I did not intend that the remarks made in my paper should apply either to Jamaica or Trinidad, because I understand there are laws in those Colonies by which the authors of injurious fires can be punished. With regard to the statement that public opinion is not ripe for legislation on this subject, I should like those who speak in this way to tell us what they mean by public opinion. In the islands where these fires are taking place, is there such a thing as public opinion? I can say that in Dominica the people are quite prepared for a law on this subject. It will, I believe, be quite sufficient if a law, combining the provisions now in operation in Jamaica and Trinidad, is passed and judiciously enforced in Dominica as well as in other parts of the West Indies.

Chaff-cutting Machines.



MACHINE WITH SAFETY GUARDS.

Of the numerous accidents which occur with farm machines and machinery, one of the most common is that which occurs in the use of chaff-cutters.

So often and serious have been these accidents to users of these machines that we learn from the *Rural World* that special legislation has been adopted, having for its object the protection of work-people. It is enacted that "any person who permits to be worked any chaff-cutting machine belonging to him, or used for his service or benefit, who does not comply with the requirements of the Act, shall be liable on summary conviction to a penalty not exceeding £5." The above illustration gives us an idea of the method of protection and safety guards provided for. The increased cost would be but little, and we learn that Messrs. Richmond & Chandler of Manchester exhibited at the Royal Agricultural Society's Show a model machine, like the above illustration. No doubt, machines now in the Colony could be boxed up and made safe, and in importing new ones it will be wise when ordering machines in England to obtain those complying with the new regulations.—EDITOR.

Protecting Vineyards against Hail.

One of the greatest troubles the viticulturist and the fruit-grower have to contend against is the occurrence of severe hailstorms late in spring. Farm crops also often suffer greatly from this cause. Some extensive districts in Europe are liable to be visited by spring hail-storms, and the losses caused by them are often very heavy. An attempt has been made lately to afford the vineyards some protection

from these storms, and if we may judge by the reports, the efforts have met with a remarkable success. The principle adopted is to fire a peculiar kind of gun skywards on the approach of a hailstorm, and the invariable result is that the hail, instead of destroying a large proportion of the young grapes, descends harmlessly in the form of rain. In what way the hailstorm is influenced by the discharge is not known, but the evidence that the effect is produced is beyond a doubt. The affair has now passed beyond the experimental stage. The first of these mortars was made by M. Alberto Stiger, in Austria, and M. Patrucco in Italy, and they were followed by M. Vermorel in France. The mortar is of a peculiar shape. It is mounted on a tripod, and consists of a portion, which may be called the breech, containing the charge of powder (80 grammes), $2\frac{3}{4}$ oz., which is fired by a detonating cap. What represents the barrel of the gun is shaped like an inverted cone, and is made of sheet-iron.

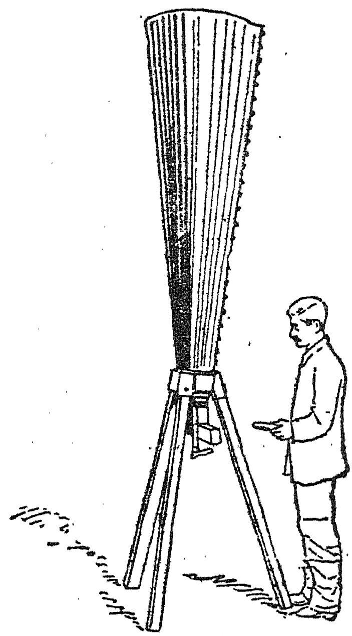


FIG. 1.

HAIL PREVENTION GUN.

On the near approach of a hailstorm the gun is fired, and its influence extends over an area of 25 hectares (62 acres or $29\frac{1}{2}$ morgen). So certain is the effect that even some seconds after the hail has commenced to fall, the ameliorating influence of the discharge becomes at once apparent. The grapes within the influence of the mortar are uninjured, while outside that area it was estimated that fully 10 per cent. of the crop was lost. The cost of putting up a mortar, with shed for ammunition, &c., is estimated at about 250

francs (£10 8s. 4d.), and the expenses per annum, including 500 charges, are set down at 79 francs (£3 5s.). The *Journal d'Agriculture Pratique,* from which we take our sketch of the mortar, states that already there are 15,000 of these mortars in use in Italy, where a year before there were only 2,000. The cabin for holding the ammunition is placed so close to the mortar that the projecting roof almost touches the long barrel of the gun. What may be used for protecting vineyards from hailstorms may also be employed for protecting orchards and even farm crops. In Europe the expense of establishing these mortars is regarded as a cheap means of insuring the vineyards against loss from hailstorms.—*Australasian.*

Artificial Manures.

The following extracts are taken from the Annual Report of Mr. A. Gibson, F.C.S., Analytical Chemist, London, published in the *Mark Lane Express* :—

"In the preparation of fertilisers by the chemical manure manufacturer, raw phosphates, of course, constitute one of the chief materials required, on the supplies and cost of which the price of all dissolved manures to the farmer mainly depends, while the production of effective fertilisers for the object in view is largely due to a judicious choice and blending of these and other substances on the part of manufacturers.

Of the more recent raw phosphates, concerning which a few words may be said, the Land Pebble Phosphate is worthy of notice, as, although at present chiefly used on the Continent, it well deserves careful trial in this country. The percentage of phosphate of lime varies from 68 to 75, and the combined oxide of iron and alumina amount to 3 to 3½, which is not excessive, and the material possesses no other qualities to which any exception could be taken. Tennessee Phosphate has recently been largely employed, and yields a high percentage of phosphate of lime, but has rather much oxide of iron and alumina. Another material, termed Gafsa Phosphate, has been met with, and if forthcoming in quantity promises well.

Oxide of iron and alumina, as is well known, occur more or less in nearly all raw phosphates, and have the effect of causing the soluble phosphate to "go back"—that is to say, yield a lower percentage after a time than when freshly made, and so give rise to questions of quality. This action proceeds mainly during the heating of the mass when freshly prepared, and disputes regarding composition may be materially lessened by allowing the superphosphate to remain as long as possible in bulk before taking final samples upon which to base contracts. It should be mentioned that phosphate which has thus gone back and known as reduced, precipitated, soluble in citrate, or reverted phosphate, while quite distinct from soluble

phosphate, and, of course, excluded in any contract when the latter is specified, is yet possessed of considerable agricultural value, differing materially in this respect from the undissolved mineral phosphate referred to below. The percentage of reverted phosphate in a manure can be estimated if desired. The numerous longer known raw phosphates do not require any special comment on this occasion, as their several merits and demerits are now well understood by most manufacturers of chemical manures.

It need hardly be repeated that in all cases where raw mineral phosphates are treated with acid to make superphosphate and similar dissolved manures, the object should be to render as large a percentage as possible soluble, yet although this might seem to be the alphabet of the business, I am often surprised to meet with so many samples in which this rudimentary principle appears to be quite overlooked—as much as half or more of the phosphate of lime sometimes being left in its original state, probably with the mistaken idea of economising acid, but the phosphate so left is for all practical purposes wasted. On the other hand, the majority of makers have well mastered the art of rendering the phosphoric acid present available to the utmost practicable limits.

Should a superphosphate so prepared prove of higher quality than is required for direct sale, it can be reduced to any desired standard by the addition of other materials, but in doing so special care should be taken to ensure even and uniform admixture, or the resulting product will test unequally; chemists are frequently blamed for giving incorrect results in such cases, when in reality the fault is due to this cause. Such difficulties are especially likely to occur with reference to mixed special manures in which several ingredients are intermingled in the dry state, because it is assumed as certain proportions of these are added together in the aggregate therefore every part of the bulk will answer by analysis to the calculated quality; but this by no means follows, particularly when a small quantity of some concentrated material is mixed with much larger proportions of inferior substances. There can be no question that this point is one requiring more attention than is commonly deemed necessary—and the same is true of sampling; elaborate precautions being found requisite, and therefore adopted, in drawing samples from valuable cargoes. In explanation of the foregoing facts, it may be remembered that a large bulk of several components is never all mixed together, but only the successive small portions of it operated upon at one time.

With regard to the use of such special compound manures, many farmers now prepare the mixtures themselves, buying the components separately, but it may be questioned whether they get any advantage by so doing, as, apart from having to purchase the constituents in small quantities, and therefore on less favourable terms, they lose what should be one of the chief benefits of buying of manufacturers, viz., a more perfect intermixture of ingredients than is attainable by amateur methods, which must be as thorough as possible, so that

when applied to a crop every plant shall receive its fair share of every kind of nutriment.

The basis of fertilisers of this class is usually superphosphate of various grades or bone manure, together with sulphate of ammonia and sometimes potash, but the latter is seldom necessary when heavy dressings of farmyard manure are used; when, however, specially required, as for potatoes, it is most economically bought separately as kainit, which also furnishes salts of magnesia and soda. Nitrate of soda is sometimes used in such mixtures, but apart from its undesirable property of becoming damp I should prefer sulphate of ammonia, particularly for potato manures.

A large number of samples of basic slag have been analysed, the quality yielding about 32 to 35 per cent. phosphate of lime being most popular. Many of higher grade and some lower are in the market, and it is the buyer's place to judge which affords him best value, assuming, of course, the requirement of fine grinding is equally well fulfilled in all, this being a highly essential point in connection with the manure, and the 80 per cent. minimum generally accepted is liberal to the seller, as figures considerably over this are frequently forthcoming, and practically such samples are worth more per unit of phosphate. The coarser portion of basic slag includes in greater or less proportion particles of iron and steel, which not only are at best useless in the soil, but also constitute a source of difficulty in obtaining accordant results in analysis, for it is impossible to properly reduce them by grinding, while their exclusion would obviously give a fictitious improvement in quality.

Bone meal is still largely used, and answers well in certain districts; some admirable samples containing an unusual proportion of animal matter, and showing from 5½ to 6 per cent. of ammonia and about 40 per cent. of phosphate of lime, have been met with. The material was very finely ground, and would have an excellent effect either alone or in conjunction with mineral superphosphate. I have also had various meat guanos brought under my notice having about 6 to 8 per cent. of ammonia and 20 to 30 phosphate of lime; they are well suited to numerous agricultural and horticultural purposes, and merit a more extended use, either alone or in combination with other appropriate sources of plant food. Fish guano is, of course, unsurpassed as a general manure, but the lower grades have now only about 3 per cent. ammonia and some 60 of phosphate."

Short-legged Hens.

A correspondent at Christ's College, Cambridge, asks for information as to what Shakespeare meant by "short-legged hens." The phrase occurs when Master Robert Shallow orders as a dinner for Falstaff "some pigeons, Davy, a couple of short-legged hens, a joint of mutton, and any pretty little tiny kickshaws." The passage is

interesting as showing that, even in Shakespeare's time, short-legged hens were regarded as being, what they undoubtedly are, the best and plumpest for the table. At that time fancy breeds were unknown, and the farmyard fowls that were regarded as the most valuable were those that had, like the Dorking and our present Surrey and Sussex fowls, short legs. Many of our present fancy breeds are characterised by long legs, which are produced not naturally but by the unnatural selection of fanciers, until such enormities as long-legged Game, Langshans, &c., result, the former being so obviously useless as table fowl that they have even been excluded from the schedules of the Royal and other agricultural societies.—W. B. T. in *The Field.*

Importation of Poultry into South Africa.

On February 5th the Colony Poultry Farm sent to South Africa eight coops containing 100 birds, consisting of white, gold, silver, partridge and buff Wyandottes, Langshans, buff Orpingtons, white and brown Leghorns, Plymouth Rocks, Anconas. And on February 19th they also shipped for South Africa a pen of white Wyandottes, three pens of Aylesbury ducks and ten Belgian hares, while on January 31st the firm consigned to New Zealand one pen each of white Wyandottes, black Minorcas and brown Leghorns.—*Poultry.*

Fighting Sand with Grass.

There are vast tracts of land along our sea coasts and adjoining the great lakes, either composed entirely of sand, or constantly subject to the damage done by sand drifts. The regions afflicted by this unfriendly element are liable to be devastated at any time. What the rare blizzard and still rarer cloudburst sometimes inflict upon other communities, these may expect with every high wind and the ordinary storms of all seasons. Great sand drifts pile across the track of railroads, and must be removed while the traffic is delayed. Dry sand is swept over the fields to the injury of the farmer's crops, and the sandy belts are encroaching, year by year, upon the fertile soil. A large portion of our river and harbour appropriations each year goes for repairing damages caused by the action of wind and water on the sand, and the very existence of certain harbours has been, on more than one occasion, threatened by this danger. For centuries the countries by the sea have endured the evils arising from this condition, and have sought with indifferent success to lessen them. It seems, however, that nature has provided an ample remedy

for her own curse in the form of certain grasses that grow in sandy wastes. Wherever they appear the sand is held intact, and it has been found that it is possible to select and transplant these grasses so that the most lawless beaches may be held in control. By their aid the people of Holland have finally secured their hard-earned country from the constant efforts of the North Sea to reclaim it; and, after a contest of nearly a hundred years, France has transformed the desolate shores of Gascony into fertile fields and forest lands.

At an early date in our history the New England States realized the value of these grasses and passed laws for their preservation. It was a penal offence to destroy them, and, in some instances, committees were formed and given authority to enter upon any property if it was covered with loose sand and plant beach grass. Cape Cod, once in constant terror of sandstorms, was eventually rescued from these visitations by the work of such committees.

For many years the Government at Washington has, through the Bureau of Agriculture, been investigating the nature of sand grasses. It has learned what other countries have accomplished with them. It has brought specimens from all lands and gathered them by the hundreds, representing every known variety growing wild in this country. It has studied their nature and habits, experimented with them under all possible conditions, and finally it has made a number of trial plantings in the sandy regions along the shores of Massachusetts, California and Florida.

Other nations with greater deserts of sand in their territory than those of this country, are watching the progress of these experiments. If they prove successful, we may expect to see a gradual disappearance of such places in Europe which have for centuries stood as almost insurmountable barriers to the progress of civilization.—*Pearson's Magazine.*

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows:—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 8th March 1901:—

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz.:—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Insti-

tute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
....
....

Owner's name and address ....
....

In charge of...

Place to which Cattle are being sent.............................

(Signature)...

(Address)...

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature...

(Address)...

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent......................

(Inspector's signature)..

(Address)..

Date...................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices to date, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896, 30th September, 1897, 27th October, 1898, 13th April and 6th July, 1899.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	£6 10 0	per ton of 2,000 lb.
	Potato and Grain Guano	8 5 0	,, ,,
	Nitrate of Soda	12 0 0	,, ,,
	Superphosphates 39/40 per cent.	6 0 0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4 15 0	,, ,,
	Sulphate of Ammonia	0 19 6	per 100 lb.
	(Prices free on trucks, Cape Town.)		
De Waal & Co., Cape Town.	Jadoo Fibre	0 10 6	per bale of 112 lb.
	Jadoo Liquid	0 2 6	per gallon.
Jas. Flower & Sons, Cape Town.	Economical Bone Fertilizer	8 10 0	per ton of 2,000 lb.
	Bone Meal	8 10 0	,, ,,
	(Prices free on trucks, Cape Town.)		
Jas. Searight & Co., Cape Town.	No. 1 Superphosphate	5 5 0	,, ,,
(Containing 26 per cent. Tribasic Phosphate of Lime.)			
	No. 2 Superphosphate	5 15 0	,, ,,
(Containing 30 per cent. Tribasic Phosphate of Lime.)			
	No. 3 Superphosphate	6 7 6	,, ,,
(Containing 37 per cent. Tribasic Phosphate of Lime.)			
	Vine Fertilizer	10 0 0	,, ,,
	(Prices free on trucks, Cape Town.)		
White, Ryan & Co., Cape Town.	Potato Manure	8 10 0	,, ,,
	Grain or Cereal Manure	7 0 0	,, ,,
	Tree and Vine Manure	6 10 0	,, ,,
	Pure Bone Meal	6 10 0	,, ,,
(Prices free on trucks at Woodstock Station.)			
Odam's Manure & Chemical Co., Port Elizabeth.	Odam's "Complete" Fertilizer	9 0 0	per ton.
	Odam's Vine Fertilizer	8 0 0	,, ,,
	Odam's Vitriolized Bones	8 0 0	,, ,,
White, Ryan & Co., Cape Town.	Odam's Cereal Fertilizer	8 10 0	,, ,,
(Prices free on trucks at Cape Town or Port Elizabeth.)			
Woodhead, Plant & Co., Cape Town	Thomas' Phosphate Powder (Basic Slag)	£4 5 0	per ton of 2,000 lb.
	Kainit	5 5 0	,, ,,
	Sulphate of Potash	16 0 0	,, ,,
	Muriate of Potash	16 0 0	,, ,,
	Superphosphates	5 5 0	,, ,,
	Nitrate of Soda	14 10 0	,, ,,
	Sulphate of Ammonia	1 2 6	per 100 lb.
	Vineyard Manure	1 15 0	per 112 lb.
	Tobacco Manure	1 15 0	per 200 lb.
	Government Guano:—		
	Ordinary Guano	6 10 0	per ton of 2,000 lb.
	or	0 13 0	per bag of 200 lb.
	Rock Guano	6 17 0	per ton of 2,000 lb.
	or	0 13 9	per bag of 200 lb.

For use within the limits of the Colony.
Price includes delivery at Cape Town Railway Station.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 6th April, 1901, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lbs.	B. Wheat Flour. per 100 lbs.	C. Boer Meal. per 100 lbs.	D. Mealies. per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat-hay. per 100 lbs.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ...	...	...	...	...	..	...	...	...	...	...	...	...	...	..	...	...
Beaufort West ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burghersdorp ..	0 11 6	...	...	0 13 6	...	0 13 3	...	0 13 6	0 12 0	...	...	0 0 7½	0 1 3	0 2 11	...	...
Cape Town ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Clanwilliam ..	0 12 0	0 15 0	0 14 0	0 9 6	0 11 0	0 9 0	0 12 0	0 9 6	1 5 0	0 1 3	0 0 7	0 0 6	0 1 6	0 1 0	12 0 0	0 18 0
Colesberg ...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	0 10 6	...	0 15 0	0 14 0	...	0 15 0	...	...	...	...	0 0 10	0 0 8	0 1 6	0 2 0	17 0 0	1 1 0
East London ...	0 12 6	0 18 0	0 17 6	0 13 6	0 9 6	0 15 6	0 18 0	0 12 0	1 2 6	0 1 6	0 1 0	0 1 0	0 2 6	0 3 3	26 10 0	1 4 6
Graaff-Reinet ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graham's Town ...	...	...	...	0 11 0	...	0 10 0	...	...	0 15 0	0 1 5½	0 0 8	0 0 9	0 1 8	0 3 2	...	...
Kimberley ...	0 13 0	0 16 6	0 14 0	0 13 0	0 13 0	0 12 0	0 16 0	0 12 6	1 0 0	0 1 6	0 1 0	0 0 10	0 2 0	0 3 0	£17 to £21	18/- to 22/-
King Wm's Town	0 15 0	16 6	1 8 6	0 12 6	1 2 6	0 17 6	0 17 6	0 12 9	0 16 0	0 1 1	0 0 10	0 0 9	0 1 7	0 3 0	£17 10/- to £21	18/- to 25/-
Malmesbury ...	0 19 6	0 15 0	0 12 0	0 10 0	...	0 9 0	0 10 0	0 8 6	0 10 0	0 1 3	0 0 7½	0 0 6½	0 1 6	0 2 3	16 0 0	1 3 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(continued).

CENTRE.	A. Wheat. per 100 lbs	B. Wheat Flour. per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies. per 100 lbs	E. Mealie Meal. per 100 lbs.	F. Barley. per 100 lbs.	G. Oats. per 100 lbs.	H. Oat Hay. per 100 lbs.	J. Potatoes. per bag	K. Tobacco (Boer Roll). per lb	L. Bee per lb	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 17 0	0 12 0	0 7 6	..	0 6 0	0 10 0	0 7 6	0 12 0	0 1 3	0 0 9	0 0 9	0 1 3	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	.	..	...	...	..	..	...	...	...	...	...	..	...
Port Alfred	...	...	...	0 12 6	...	...	...	9 0	0 11 0	...	...	0 0 10	0 2 6	0 2 7	...	...
Port Elizabeth ...	...	...	...	0 0	...	0	...	0 13 0	1 0	0 1	0 0 7	0 0 8	0 1 6	0 3 6	..	..
Queen's Town ..	0 1	0 17 9	0 14 3	0 1 3	0 12 0	16	0 15 9	0 11 6	0 12 0	0	0 0 8	0 0 8	0 1 6	0 3 0	...	...
Tarkastad ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18	1 3 6	0 1	0	0 16 9	...	0 13	0 18 0	1 0 0	0	0	0 0 9	0 2 0	0 2 6	...	...
Worcester ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

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AGRICULTURE.

Reports and Prospects.

East London.—WARD 1, *Mar. 30th.*—The country is looking well grass is green, cattle are thriving, and crops promise a good return The Government drill working at the Police Camp has obtained an inexhaustible supply of good water at one hundred and fifty feet. It was much needed, and is a good example of what can be done to obtain water.—T. WARREN. WARD 2, *April 1st.*—Prospects of March were the same as for February. Cattle healthy, and veld good.—

E. HOLDSTOCK. WARD 3, *April 2nd.*—There is no appreciable change since my last report; rain continues to fall at intervals and the veld is at its best. The mealie and Kaffir-corn crops are far better than any we have had for a number of years, and excluding very late sowings, will mature without more rain. One case of lung-sickness has broken out, and has been dealt with by proclamation; otherwise, stock are healthy and in fair condition. Young locusts are numerous on some farms, and are being dealt with principally by spraying with soap and water. The operation is somewhat difficult in parts owing to the extreme length of the herbage and the cuteness of the pest in seeking cover when molested. The fruit crop is practically finished, and the returns are slightly better than last year, owing to the moth and fly not doing the same amount of damage.—T. WILLOWS. WARD 6, *April 2nd.*—Good rains have fallen during the month and the prospects for all crops are very good. Grass is plentiful, cattle healthy and in good condition, and, so far, no young locusts have appeared.—W. KRETZMANN. WARD 7, *April 2nd.*—Since my last report copious rains have fallen, making the outlook most cheerful, notwithstanding the presence of numerous swarms of locusts in the hopper stage as yet, though a month may see some of the more advanced on the wing. Hundreds of swarms have been destroyed by means of soap-spraying—Government aided scheme—which, generally speaking, has been a great factor in saving the mealie and Kaffir-corn crops, which taken on the whole are most promising. A quantity of the earlier matured has been reaped and marketed, Kaffir-corn especially realising rather good prices just now. The present outlook has not been experienced for upwards of five years, and the depression experienced by the agricultural community is visibly becoming less acute with the more cheerful surroundings. Veld is abundant, as is also the water supply, which means being set up for the winter. Stock are in good condition, healthy and thriving.—W. ELLIS.

Kokstad, *April 4th.*—A good deal of wet weather has been experienced during the past month, the rainfall for that period being 2.46 inches. The veld is looking well and so is the mealie crop, but forage is getting very scarce. Stock of all kinds appear in good condition, although redwater, gallsickness and lungsickness have put in an appearance in various parts of the district. The latter disease has been probably imported from Basutoland and the Orange River Colony.

W. LEARY, A.R.M.

Maclear, *March 31st.*—The prospects for growing crops are very good, splendid rains having fallen during the month. Stock large and small are doing well. Smallpox has broken out in a kraal in Coningsby ward about 15 miles from the village, and two men and one woman are suffering from the disease. The people at this and neighbouring kraals have been vaccinated by the District Surgeon and it is not anticipated that the disease will spread further.

L. PINKERTON, A.R.M.

Matatiele, *April 11th.*—During the past month agricultural prospects have improved greatly, and crops promise a very fair harvest should frosts not be experienced too early in the season. I regret to report that several cases of lungsickness have broken out in the district, consequent upon the introduction of diseased cattle from Basutoland, which border has now been closed to the importation of cattle from that country by Proclamation.

W. BELLAIRS, R.M.

Mount Ayliff, *April 4th.*—During the past month copious rains have fallen in most parts of this district, and the pasturage is excellent. Crops are doing well and a fair harvest may be anticipated if all continues well. Lungsickness has broken out in the Location of the Headman Nota and the infected area has been placed in quarantine. No locusts have appeared lately. R. HARRIES, R.M.

Mount Fletcher, *March 30th.*—Cattle and other stock doing well. Two cases of lungsickness in Lebenya's Location, one has died and the remaining cattle have been inoculated and quarantined. Crops are in splendid condition. H. TILLARD, R.M.

Mount Frere, *April 2nd.*—There is very little to add to my last month's report. A few good showers of rain fell during the month, and freshened up both veld and crops; the latter are healthy and well advanced, and a good harvest is anticipated. All stock are in prime condition, and no fresh cases of lungsickness have been reported. A number of horned stock have been imported into the district by speculators, and exchanged for horses, but owing to their being imported from higher veld, the sudden change has proved fatal to a large percentage. H. GARNER, A.R.M.

Peddie, *April 4th.*—The country is now looking charming. Fine rains have fallen and there is a good supply of water. The crops of mealies and Kaffir-corn are very fair and stock of all kinds are in good condition and healthy. A. W. PRESTON, A.C.C.

Qumbu, *April 1st.*—There is little to add to my report for February. Rains have been plentiful and crops are looking well. The pasturage is at its best and in abundance. A few cattle are still affected with lungsickness within the quarantined area mentioned in previous reports. A. REIN, R.M.

Tsolo, *April 1st.*—Very fair rains fell during the latter days of last month, and none too soon as they were much required; crops have benefited thereby, and if frost keeps off very fair ones may be harvested. However, as dry corn is very scarce and dear, a good deal of green food is being consumed for present wants. Lungsickness broke out in a herd of cattle on a farm adjacent to the village, and I have not yet been able to find out from the caretaker the origin of the outbreak. I have no doubt he knows, but Native

like pretends he does not,—but as I learn his wagon was away some time ago in Pondoland buying grain, his cattle probably picked up the disease there. J. SIMPSON, R.M.

Umzimkulu, *March 31st*.—The district has been blessed with warm rains during the past month, which have been of very great benefit to growing crops and pastures, so that the prospect of a fair crop of mealies and Kaffir-corn is distinctly good, if early frosts do not appear. Stock of all kinds are in splendid condition and free from disease of an infectious or contagious nature. Large numbers of horses are still being bought up for military purposes at remunerative prices; indeed, judging from the numbers which have crossed into Natal over the Union Bridge here, the next agricultural statistical returns are bound to show a great reduction under this head.

E. J. WHINDUS, R.M.

Uniondale, *April 1st*.—During the past month splendid rains have fallen, and the district is now in a condition it has not been in for years. Grass is plentiful and the mealie and bean crops promise to be a great success. All kinds of stock are in good condition, and no disease of any kind has been reported to me. Some swarms of locusts have passed over the district but these appear to have done no damage. C. B. SCHOLTZ, C.C.

Introduction of Skilled Agricultural Labour from Europe.

The need for a more skilled class of labour than is at present available in the Colony having for some time past been keenly felt by those engaged in fruit culture and viticulture as well as in other branches of farming, the Government, having been approached by the members of the Fruit-Growers' Congress held at Stellenbosch in May, 1900, has instituted enquiries, through the Agent-General in London, from the principal European countries, with a view to eliciting particulars as to the class of labour available, rate of wages, conditions of service, cost of transportation to this country, etc.

As the best means to obtain the most reliable information on these heads appeared to be through H.M. Consuls and Commercial Attachés in the principal European countries, enquiries were instituted through the Foreign Office, from these officers in Spain, Portugal, Austria, Southern France, Germany and Italy.

The reports of these various gentlemen have now come to hand and contain much that is of general interest as to the status of agricultural labour in the countries mentioned.

Unfortunately, however, the information embodied in these reports, generally, is not of such a nature as would lead one to hope for much assistance as regards the required class of immigration from Europe.

Apart from the fact that the rate of wages which would be expected to be offered to skilled viticulturists and horiculturists, in order to induce them to leave the land of their birth, would have to be so high as to be beyond the limit to which the average Colonial farmer could venture, it is apparent from the reports received, more especially in regard to Germany and Austria, that the Governments of these countries do not look with favour on any schemes having in view emigration from the State on any large scale. As a matter of fact, in the former country no emigration is permitted except under licence from the Government. Every Emigration Agent, who must always be a German citizen, requires a licence, and is liable to punishment if, without permission from the authorities, he encourages a man between 17 and 25 years of age, and who is liable to military service, to emigrate. Emigration Agents are furthermore forbidden to encourage emigration of Germans for whom Foreign Governments or Colonial Societies have paid travelling expenses wholly or in part.

The reports received from France, Spain and Portugal, also, are not of an encouraging nature.

The accompanying very interesting report on the "Suitability of Italian Agricultural Labour for Employment in the Cape Colony," prepared by Mr. Kidston, 3rd Secretary to His Majesty's Embassy at Rome, contains much valuable and useful information on this head, and is published *in extenso* for the general information of farmers and others interested:—

PART I.

Scantiness of Information afforded by Cape Government.

In drawing up the following report on the suitability of Italian emigrant labour for employment in the vineyards, fruit-gardens and farms of Cape Colony, and on the general conditions under which Italian skilled labourers could be induced to emigrate to the Cape, I have been somewhat handicapped by the scantiness of the information afforded by the Cape Government as to the exact requirements of intending employers.

The Congress of fruit-farmers and others held at Stellenbosch, on whose initiative the Government instituted these enquiries, ask for a more skilled class of labour than that at present available, but give no hints as to the qualifications and defects of the labour which they have hitherto employed; they also desire to be informed as to the rate of wages which Italian labourers would demand and the general conditions of service which would be acceptable to them; but the rate of wages must necessarily depend on the cost of living in the Colony, and conditions of service must largely be influenced by the question whether the farmers wish for permanent settlers,—men, that is, who would emigrate with their wives and children—or for independent day-labourers,—who would emigrate with the intention of returning to Italy as soon as they had made a little money.

In default of any information on these points I have endeavoured

to render my report as useful as possible by citing the rate of wages obtained by Italian emigrants employed in like work in other countries, with the average prices current there of a few of the chief necessaries of life. I have also touched on the difference in the conditions of service likely to be acceptable to the permanent settler with a family and the casual farm-hand, emigrating with the intention of soon returning to his native land.

1.—WOULD ITALIAN LABOURERS BE WILLING TO EMIGRATE TO CAPE COLONY ?

GROWTH OF ITALIAN EMIGRATION.

Emigration from Italy has assumed such gigantic proportions of late years, and the whole question is so complicated, and withal so interesting, that it is difficult to embark upon it at all without straying into some of the innumerable channels which flow from it on all sides and offer such tempting cruising-grounds to the purely curious observer as well as to the statistician and the practical statesman.

The following figures are interesting as showing to what gigantic proportions Italian emigration has attained during the years 1888-1899:

Year.	Permanent or for an indefinite period.	Temporary.	Total.
1888	195,993	94,743	290,736
1889	113,093	105,319	218,412
1890	104,733	112,511	217,244
1891	175,520	118,111	293 631
1892	107,369	116,298	223,667
1893	124,312	122,439	246,751
1894	105,455	119,868	225,323
1895	169,513	123,668	293,181
1896	183,620	123,862	307,482
1897	165,429	134,426	299,855
1898	126,787	156,928	283,715
1899	131,308	177,031	308,339

ATTITUDE OF ITALIAN GOVERNMENT TOWARDS EMIGRATION.

There is little wonder if, with such figures as these before their eyes, Italian statesmen are beginning to realize that this wholesale draining of the country of a large proportion of its most valuable labour may be a great danger, and the result of this awakening is already manifest in a distinct inclination on the part of the Government to discourage emigration save under the most favourable conditions and with the most reassuring guarantees. A Parliamentary

Committee has been instituted to examine the question, systems of internal colonization have been started, land has been reclaimed at Government expense, and a rigorous passport system has been put into force.

It is of course no business of the present report to enquire into the causes of the mammoth emigration or to speculate as to its results, but it is most distinctly its business to point out that unless some substantial guarantee of good treatment and some fair prospect of bettering their position be held out to intending emigrants, the Italian Government, with the wisdom born of experience, will do its utmost to frustrate all attempts which may be made to induce Italians to emigrate to the Cape.

Difficulty of Checking Flow of Emigration.

As to the question whether any appreciable number of Italians could be found willing to embark for South Africa, I have no hesitation in saying that, with the smallest inducement, any number required might be found at a few days' notice; the only difficulty would be to arrest the flow once it had begun. Italian emigrants have a curiously *magnetic property*, of which the emigration to the United States of America affords a striking instance. It began with a swindle by a firm of emigration agents, who, having certain clients who were desirous of going to South America (where Italian emigration was already in full swing), and being unable to find room for them on the vessels sailing for South American ports, shipped them off to the United States. They happened to arrive at a time when labour was in much demand there, they were found to be more satisfactory in their work and less exacting as to wages than their Irish brethren; they throve wonderfully, and wrote to their friends and relations at home to follow their example, with the result that the number of Italian immigrants disembarking at the port of New York alone during the first half of the current year reached the large total of 99,019 souls.

Applications to go to the Cape already Frequent.

Her Majesty's Consul at Genoa informs me that he frequently has applications from Italians desiring to go to the Cape, and since the war in South Africa Her Majesty's Embassy in Rome have been inundated with enquiries by persons desiring to go to South Africa in all sorts of capacities.

The difficulty of these people is that there is at present no direct service of steamers carrying emigrants from Italy to Cape Colony, and I am informed that in the rare cases in which Italians have gone there they have had first to make their way to England.

II.—GENERAL SUITABILITY OF THE ITALIAN LABOURER FOR WORK OF THE DESCRIPTION REQUIRED.

Of the general suitability of the Italian labourer for the work required there can be no doubt. The great fertility of Italy, the

enormous variety of her products, the prevalent system of small holdings throughout a large portion of the country, which enables, nay almost compels, the peasant to have some knowledge of the most varied forms of cultivation; all these causes combine to make true the statement published by Mr. Neville Rolte, Her Majesty's Consul at Naples, in one of his Consular Reports,—that "every Italian peasant is a born gardener."

Italian Crops compared with those of Cape Colony.

From a study of official documents issued by the Cape Government and by the Emigrants' Information Office, I can find no crop of any kind mentioned as being cultivated in Cape Colony which is not also successfully grown in this country:—unless indeed it be the "naartje," which, however, may be grown in Italy under another name.

III.—DISTRICTS FROM WHICH LABOUR MIGHT MOST ADVANTAGEOUSLY BE DRAWN.

It seems certain, then, that labour of the kind required might be procured in this country, and it would be well perhaps to give a few hints as to the districts from which such labour might most advantageously be drawn.

This question of the most favourable locality must be based on the three following considerations, which I propose to treat in due order:—

A. The nature of the cultivation on which the labour is to be employed.

B. The varying reputations of the inhabitants of different districts for industry, intelligence and good conduct.

C. The facilities available for collecting and transporting intending emigrants.

Chief Crops Cultivated in Italy.

Consideration A.—As I have been unable to procure any exact statement of the forms of cultivation for which the imported labour would be required, I append a simple statement of the principal crops cultivated in various parts of Italy. The following are practically universally cultivated throughout the kingdom, and it may be taken for granted that the large majority of Italian peasants have at least some practical knowledge of their cultivation:—The usual cereals, the vine, maize, olives, beans and peas, peaches, apples, pears, figs, tomatoes, and all ordinary garden produce.

Districts Noted for Special Products.

The best wines are produced in

Tuscany	(Chianti and Val Paradiso)
Piedmont	(Barbera, Barolo, Asti)

The Roman Province	...	(Frascati, Genzano)
Naples District	...	(Capri, Posillipo)
Sicily ...	...	(Marsala, and other strong red wines formerly largely used in France for the Bordeaux trade.)

Early fruits and vegetables are chiefly grown in the near neighbourhood of Naples.

The best maize comes from the Roman Campagna and from the Puglie.

The Genoese Riviera, the Sabina, and the neighbourhood of Bari are noted for their olives.

The following crops are more confined to special districts:—

Oranges and lemons from Sicily, Calabria, the neighbourhood of Naples, and the Italian Riviera.

Almonds and pistacchio nuts from Sicily and the South.

Rice in Lombardy, Sicily, and some parts of the Veneto.

Hemp and flax from Lombardy, the Veneto, Sicily and Naples.

Cotton, carob beans and sumach from Sicily.

Silk in the North and in every district where the mulberry flourishes.

The Sicilians are famed for their skill in handling oranges, and have even been sent for as far as to Greece to pack the fruit.

The lemon-gardens in Sicily have lately suffered much from diseases, which has handicapped the native growers in their competition with foreign producers and would probably be an inducement to emigration among the labourers engaged in this form of cultivation.

Labourers accustomed to elaborate systems of irrigation might be found in many parts of the Peninsula, but more especially in Lombardy, where watering by artificial means has been carried on for centuries.

Causes of Inferiority of Italian Fruits and Wines.

I may point out here that fruit in Italy, with the exception of figs, is usually of an inferior quality, and that the wine is badly made and does not command a high price; but this is due, not to defective cultivation nor to want of skilled labour, but to tenacity of traditions and the system of small holdings, which prevents enterprise, combination, and the employment of large capital.

Difference in Civilization of Northern and Southern Italy.

Consideration B.—The vast differences in the moral and social conditions of various parts of Italy may be readily proved by a reference to criminal statistics. Italy may be divided socially into two distinct portions, the North and the South, and this division is important when we come to consider from what district emigrants might most advantageously be drawn.

The Italian of the North, of Piedmont, the Veneto, Tuscany, Liguria and Umbria, has a higher reputation for honesty and

industry than the Southerner. Statistics show that he is more law-abiding and he would therefore be less likely to prove troublesome to the authorities.

The people of the Roman Province, the Neapolitans, the Calabrians and the Sicilians, though quicker and more intelligent, are not so easy to manage; would require constant observation to prevent them scamping their work, and would be more likely to give trouble. So pronounced is this difference between various districts that certain South American States which have imported Italian colonists, have stipulated that they would only take men from specified districts.

Collection and Transport of Emigrants.

Consideration C.—The means of collecting and transporting emigrants are so highly developed throughout the country that this consideration offers but slight difficulties.

Agencies are to be found in most districts, many of them illegal and most of them unsatisfactory, which make a business of procuring emigrants for foreign countries and fleece the wretched peasants unmercifully in the process.

The Italian Government, however, if furnished with particulars and guarantees, would be willing to undertake and carry out, through the local authorities, the collection of persons suitable for the purpose required.

It need only be remarked here that almost all the emigration by sea from this country goes through the ports of Genoa and Naples, and that good labourers could probably be found in the neighbourhood of either of these ports.

IV.—GENERAL CHARACTERISTICS OF THE ITALIAN PEASANT

Before proceeding to the more precise particulars required by the Cape Government as to wages, etc., which I shall deal with under separate headings, it might be well to sketch a few of the characteristics of the Italian labourer as seen in this country, and to quote such opinions of well-informed persons as I have been able to collect as to his success as a colonist in other lands.

Effects of Prevailing System of Land-tenure.

A. His Work.—As I have before pointed out, in speaking of the general suitability of the Italian peasant for employment in viticulture and fruit and market gardening, the prevalent system of land-tenure in Italy tends to make him acquainted with the habits and needs of a great number of useful plants. But this is not the only characteristic of the Italian peasant which may be directly traced to the manner in which the land is held. Peasants in this country are mostly freeholders or farmers on the métayer system, in which rent is regulated by a division of the annual product of the farm in fixed proportions between the tenant and his landlord; in

either case the tenant has a direct interest in the fruits of his own labour, with the result that the agricultural classes are certainly among the most hard-working in Europe. That this is directly the outcome of their having a substantial interest in their work is clearly shown by the fact that on large estates, where the métayer system is not in force, especially in the South, labour requires an immense amount of surveillance, and one may see gangs working in the fields under their taskmasters much as the slaves must have worked in America in the old plantation days.

The independent peasant works long hours and works hard, and the women of some districts are as hard-working and nearly as strong as the men.

The cultivation of the vine, which is perhaps the commonest form of crop throughout Italy, has always required constant attention and care, and in these days when "phylloxera" and "peronospora" have to be combated, the work is redoubled. The crop is usually grown on a small scale, so that there can be no specializing, and sapping, propping, pruning, grafting, and in fact all the work necessary in connection with the actual cultivation of this crop, are the A B C of every Italian peasant's education; and so it is with all the commoner fruits, vegetables and plants,—apples, pears, peaches, figs, maize, tomatoes, melons, gourds, and ordinary garden produce; as a rule he understands something about them all, or at least about the greater part of them, and this is in fact generally the sum total of his education. Living on the small patch of land which has often been cultivated by generations of his family for generations of the family of his landlord, he has not the chance of becoming a specialist as he might if he were employed as a labourer with daily pay on a larger scale of farming, but on the other hand the fertility of the soil enables him to grow several crops at once and gives him varied knowledge, sheer necessity and his own interest make him a hard worker, long tradition has taught him all the simpler tricks of his trade, and Nature has gifted him with a singular cheerful character, great quickness of intelligence, and wonderful readiness of hand and eye.

Evil Effects of System of Small Holdings.

But there is another side to the results of the métayer system, and since it has its effects on the nature of Italian labour it would be foolish to overlook it here. While this system (and the same is true of the small freeholds in Italy) encourages industry, elicits personal skill, and gives scope to the exercise of individual intelligence, it is equally certain that it stifles modern progress, renders combination difficult, and excludes the benefits which might result from the employment of large capital. It is only on large estates that agriculture has made any step forward since the time of Virgil, and it would scarcely be an exaggeration to say that his "Georgics" might serve perfectly well to-day as the agricultural handbook of the class from which the Cape farmers would have to draw their labour

in Italy; modern machinery and up-to-date methods are practically unknown among them. The very causes which have combined to give these people great and varied skill in many small branches of cultivation have prevented their rising to the heights of modern technical and mechanical knowledge in any one of them, and if Cape farmers look for men with all the modern niceties of agricultural science at their finger-ends, men accustomed to various types of machinery, versed in agricultural chemistry, and able to conduct farming on a large scale, they must look elsewhere than in Italy. The Italian Government, by admirable measures, schools, and useful pamphlets, has taught the Italian cultivator much, but the traditions of the country are against the Government in this respect, and on the whole the peasant is content to grow his crops as his fathers grew them, to plant the same old fruit trees that have stood the test of generations on his little plot of ground, to drive his oxen from behind the primitive wooden plough, to tread his grapes in the old-fashioned vat, to content himself with the same sour wine that has always been the drink of his country-side, and to live and die as his fathers lived and died before him.

The following quotations from various sources, though they deal with countries where the conditions of life are widely different from those prevailing in South Africa, may yet be of some value as showing the estimate of immigrant labour for agricultural purposes entertained by persons well qualified to pass judgment upon it.

Opinions from South America.

Cav. Carlo Nagar, Italian Consul at La Plata, writes in his report of June, 1899:—

"To the Indians succeeded European cultivators, among whom, for numbers, patience, and constancy in their work, the Italians particularly distinguished themselves."

And again:—

"The Italian element is popular and respected here on account of its eminently hard-working qualities, because it contributes largely to the advancement of the country, because in noble competition of labour it renders the land fruitful, repaying the hospitality and brotherly welcome which it here receives. Wherever and however employed, the Italian always gives satisfaction to his employer and remains true to his work, honest and capable, for he is ambitious of success and desires to rise above his fellow-workmen. Cultivators are in demand because they convert the immense plains into cultivated fields, colonize and give value to the land, stimulate production and the consequent export of produce. The continual demand for colonizing cultivators offers them a good opportunity of acquiring a fair economical position in a comparatively short time. The Italian workman, almost always sober, economical, and inured to hard work, is preferred to all others."

Mr. G. Romanella, Italian Consular Agent in the province of St. Luis, Argentina, says:—

"This province does not lend itself to the amassing of great fortunes, but the greater number of the Italians enjoy comparative prosperity, which they owe to their hard work and orderly and economic habits."

The colonization and bringing into cultivation of the province of Cordobas was almost entirely effected by Italian immigrants, and Mr. Rio, who drew up statistics of the province for the Argentine Government, pays the following tribute to the Italians:—

"The prosperity of the colonies of this province, as of those of Santa Fè, is chiefly due to the Italians, and here also it is the Piedmontese who are eminent both in numbers and in quality. They are workers of marvellous endurance, strong, sober and persevering. They support without great inconvenience the inclemency of the climate and the heavy work of the fields. Always constant in his work, the Italian colonist only leaves it on holidays for the inn or the 'fonda,' where he joins a noisy throng for a game of bowls, sings, dances, and drinks a glass or two of wine or 'grappa.'"

"He is a simple and peaceable fellow . . . ."

"He is obedient and respectful to the authorities."

Count Pietro Antonelli, Italian Minister at Rio Janeiro, in a report on a visit to the State of Rio Grande do Sul, published in June, 1899, says:

"The German cultivates beans, potatoes, maize, and keeps large numbers of pigs. The Italian on the other hand, and this is a most remarkable fact, besides cultivating all these crops, has introduced the cultivation of the vine on a large scale and the vastly important cultivation ot wheat, which is considered to be one of the richest products of the country."

Cav. Carlo Croce, in his report on the State of Parana in Brazil, says (Oct. 1895):—

"The vine is cultivated by our Italian colonists with success, so far as profits go, though the wine is of a very poor quality."

Cav. Negri, in his report of Dec. 1899 on the State of Minas Geraes in Brazil, says:—

"The cultivation of the vine is almost exclusively in the hands of Italian colonists, especially in the Southern States of Brazil. They eagerly take to this form of cultivation, which was hitherto unknown to the Brazilians, but to them familiar and pleasant."

Opinions of British Consular Officers in Italy.

The two following extracts are from reports of our own Consuls at Naples and Venice respectively, and fully bear out the flattering verdict passed by Italian Consuls in Brazil, Argentina and Mexico.

Mr. Rolfe, in his report of 1897, says:—

"In South America the Italian colonist does remarkably well. Accustomed to hard work in a hot climate and a born gardener, he soon amasses a fortune and remits money home to bring out his wife and family."

Mr. Zuccato, in his report for 1898-99, says :—

"The Venetian peasants are very sober, frugal, industrious, law-abiding and hard-working. They ask for moderate wages and are capable of sustaining labour in hot and unfavourable climates. I think, if advantageous terms were offered and proper protection granted them, they might profitably be induced to proceed to Australia, Queensland and New Zealand. The Commercial Agent for the Government of Queensland, after having been in communication with the central authorities in Rome, has visited this district to endeavour to promote the emigration of Venetian peasants to Queensland, but one of the difficulties is that there is no line of steamers proceeding direct from Italy to that Colony."

Mr. Churchill, Her Majesty's Consul at Palermo, and at the moment of writing Acting Consul at Naples, has been kind enough to make enquiries at the latter place on the subject of Italian emigration to America; he writes to me that the Italian emigrants "make good farm and cottage gardeners, growing vegetables under the most impossible conditions."

In yet another letter he says :—

"Last year about 25,000 emigrants left Sicily, 13,000 from Palermo alone, for the States, etc. I have always thought that these people, selected groups of agriculturists and miners, might be desirable settlers in British Guiana and other Colonies."

And again :—"Italians make excellent navvies, miners and agricultural labourers, and splendid colonists."

In reply to a similar enquiry addressed to Mr. Keene, Her Majesty's Consul at Genoa, he writes to me as follows :—

"There is plenty of Italian labour to be obtained, men and women, all willing to emigrate, and they are of a good class too. I have already been asked several times whether emigrants are wanted for Cape Colony, etc., and, were a scale of wages for each class of labour available for reference and all other particulars as to passage out, forms of agreement, and necessary details, I am sure that there would be a rush for the chance of going out."

Opinions from United States of America.

I have tried to get information as to the results obtained from the introduction of Italian labour into California and Florida, countries where, it seemed to me, conditions would more nearly approximate to those of Cape Colony than in the South American States from which opinions have already been quoted, and where the labour in which Italians are engaged must be very similar to that for which they would be required in the Colony; I have not been able to lay my hand on any official publications on the subject, but Dr. Heiser (who, as medical inspector of emigrants at Naples for the United States Government, has excellent opportunities of judging the class of emigrant leaving Italy for the States) says that the Italians employed in the Southern United States as agriculturists do exceedingly well, an opinion in which he is supported by Colonel Bryington, United

States Consul at Naples, who himself employs Italian labour on his American estates.

Dr. Heiser, however, has no great opinion of the Italian emigrants as a whole, and places the Finns, Russians, Swedes and Germans above them. He remarks, nevertheless, that the Italians work for less wages, live in worse tenements, and are content with worse food.

A less favourable view of Italian labour is taken by Sir H. Dering, who, in his report of 1891, says :—

"In Italy it takes twelve men to do the work done in England by seven or eight on account of the quality of the work done, and this in spite of the fact that with the same machinery the Italian works 12 hours to produce the same amount as is turned out in England in 9½ hours."

This estimate of Italian labour however, from its reference to machinery, seems to apply more to the manufacturing than to the agricultural classes.

Opinions of Italian Landowners.

Perhaps the best tribute of all to the hard-working qualities of the Italian peasant is that paid by such Italian landlords as I have consulted on the subject; they all agree that, when employed on work in which he has a direct interest, there is no better or more intelligent workman to be found in Europe. It would be difficult to get such a decided expression of satisfaction with his labourers from any English farmer.

Such are a few of the opinions which I have been able to gather from reliable sources as to the work of the Italian peasant, and we may now consider a second phase of his character.

Italian Peasant Compared with the English Rustic.

B. His Intelligence and Education.—The quickness and intelligence of the lower classes in Italy is one of the first things that strikes a foreigner; in our Northern rustics it is common enough to find education without intelligence, but here we have exactly the opposite, —intelligence without education; the Italian peasant can, in a few minutes, grasp an idea which it would takes years to instil into the average English yokel, nor does this quickness of perception stop short at his brain, but it is translated to his fingers, so that wherever skilled work is to be done, demanding quickness and simultaneous action of brain, eye and hand, there Italian labour will be found. He has the supreme merit of never forgetting a thing once learned, and yet, with his strong sense of personal independence and his constitutional laziness, he will rarely do a thing well or promptly unless matters are so arranged that it is to be his own distinct personal and prompt advantage to do so. His intelligence may thus be said to cut both ways: it makes him capable of doing excellent work, and at the same time it teaches him to consider that work only in relation to his own interests, and to scamp it without a qualm where those interests are not involved. This should be borne in

mind in fixing the conditions of service under which Italian labour is engaged.

His Lack of Education.

His education is either non-existent or of the most elementary character, so that the average Italian emigrant would be quite incapable of making out the simplest of accounts.

In the year 1899 the proportion of Italians emigrating to the United States of America who could neither read nor write was 10.2 per cent. from the Northern provinces, and from the Southern parts of Italy the proportion reached the significant figure of 46.21 per cent. The difference in these proportions is instructive as to the relative civilization of the Northern and Southern parts of this country, a difference to which I have already alluded, and the statistics as a whole will convince intending employers of the futility of engaging Italian workmen with the expectation of getting even the simplest of pen-work from them, a conviction which will be accentuated if we quote from the same list the proportions of illiterates emigrating from other countries in the same year :—

South Italy	gave	46.21 per cent.
Germany	,,	2.70 per cent.
England	,,	2.21 per cent.
Scotland	,,	1.85 per cent.

Norway and Sweden (the smallest proportion of all) gave only 0.65 per cent.

Portugal alone gave a higher percentage of illiterates than Italy, namely 53.84 of her total emigration. Still more recent statistics of emigration at the port of New York show that in the first half of the present year (January-June 1900) the proportion of those who could neither read nor write had reached a still higher figure,—out of about 100,000 Italian emigrants disembarking at that port 60,000 at least were illiterate.

His Facility for Picking Up a Language.

Notwithstanding the fact that a large majority of the agricultural classes in this country are absolutely without education, they have a great facility for picking up a language, a much greater facility in fact than our better educated Northern races, and I have known Italian servants who could neither read or write, who, after a very few months in an English family, spoke English perfectly and with an excellent accent. Italian emigrants to the Cape would doubtless pick up Dutch with equal facility.

His Adaptability to New Conditions.

The Italian labourer, on coming to a new country, would be puzzled for a while by the difference in the seasons, by new conditions, and new forms of agriculture, and much patience and instruction on the part of his employer would be necessary, but here that natural intelligence of which I have spoken would step in, and

it is doubtful whether in any country in Europe men could be found who would overcome such difficulties in a shorter time than he would. The proof is the continual demand for Italian labour in various countries and under widely different conditions. Italians are employed on the "barrage" works in Egypt, in mining in West Australia, in agriculture in Brazil and Argentina, on the canal works in Panama, etc., etc. Indeed, they may be said to be the most adaptable and most truly cosmopolitan race in Europe.

His Sobriety and Frugality.

C. Moral and Social Characteristics.—The great advantage that Southern labour has over that of Northern countries is that the man of the South rarely drinks to excess, and the Italian is no exception to the rule; drunkenness, even in the towns, is very rare in Italy. The Italian is not only very sparing in his use of alcohol, but he is also extremely frugal in other respects, being contented with the simplest fare,—chiefly macaroni in various forms, polenta (a meal made from maize), vegetables, and very little meat.

His Carelessness as to How he is Lodged and Lack of all Knowledge of Sanitary Arrangements.

He is not accustomed to be luxuriously housed and is content with almost any kind of shelter; this carelessness of all ordinary comfort often leads to overcrowding among emigrants in places where rents are high or lodgings difficult to be obtained, and in the United States of America the Sanitary Authorities have had to step in and lay down regulations as to the minimum amount of space which is to be allotted to each person in tenements inhabited by Italians.

Sanitary arrangements, as we understand them, are practically unknown among the lower classes in Italy, and should the farmers of Cape Colony engage Italian labourers and provide them with houses to live in, they would do well to draw up a strict code of rules as to the disposal of refuse, etc., and to see that they were adhered to, for otherwise the neighbourhood of such houses might soon become a danger to the community. An effort was made some time ago to provide the lower classes of labourers on a Sicilian estate with decent cottages having windows and two or three rooms, but the experiment had to be abandoned, for before many months had passed the family had crowded once more into one room, giving over the rest of the house to their pigs and poultry, and the windows were all built up with stones. This was in the South, and it is only fair to say that the peasants of the North have more self-respect and are at least decently lodged as a rule.

His Behaviour.

Italians of the agricultural classes are generally law-abiding and well behaved, at least in the Northern provinces, and the unenviable reputation for lawlessness which Italian emigration has acquired in America and elsewhere, has its origin in the spirit of conspiracy and anarchy which is a strange inherited instinct in the lowest classes

of all great Italian cities; a glance at the history of such towns as Rome or Naples will abundantly prove that this instinctive resistance to all constituted authority has always been their heritage, and it is among mechanics and artizans, emigrants from the towns, that anarchy has its stronghold. At the same time it should be pointed out that the peasant, too has the Southern temperament, and the true Southern instinct of the knife; for this reason alone, unless a very high class of men were chosen, it would be undesirable to put them in charge of native labour on a large scale.

His Unsuitability as an Overseer of Native Labour.

The Italian, moreover, does not as a rule possess that natural aptitude for command which makes a good foreman where native labour is concerned; it would, therefore, be exceedingly rash and likely to prove very unsatisfactory if Italians were introduced into Cape Colony with a view to their filling any such posts of responsibility.

The social inferiority of the Italian emigrant (one might almost say his want of self-respect) is curiously illustrated in a report on the State of Santa Caterina in Brazil, drawn up by Cav. Gherardo, Italian Consul at Florianopolis. Speaking of the emigrants who have prospered and have succeeded in buying the plot of land allotted to them on their first arrival in the country, Cav. Gherardo points out that these successful ones almost always leave agriculture for commerce and let or sell their lands to others. "This phenomenon," says Cav. Gherardo, "is partly to be explained by the character of the Italian peasant, very different from that of the German who is his rival in Southern Brazil. While the latter is reluctant to abandon the course which he has followed from the beginning and is glad to spend what remains to him, after having paid for his claim, on the beautifying of his house and garden or on the education and bringing up of his children, such ideas never enter the Italian's head; he pays but little heed, alas, to his children; comfort and cleanliness are guests that meet with but scanty welcome in his house, and if he thinks that he can employ his money more profitably in trade, he abandons the scene of his labours and his triumphs without the least regret."

I have given this brief outline of the chief characteristics of Italian labour at home and abroad in order that intending employers, before considering the question of transport, wages, and conditions of service, might know something of the merits and defects of the labour which they would find in this country. I have dwelt on the skill, the intelligence, and the hard-working qualities of the Italian emigrant as general recommendations in any kind of work, but, not knowing with any certainty the actual requirements of intending employers, I have tried to lay particular stress on those characteristics which render him unfit for certain forms of employment, such as book-keeping or writing of any sort, management of native labour, or any work demanding the exercise of much initiative, self-control, or knowledge of modern improvements.

Awnless Brome Grass Seed (*Bromus inermis*).

A small lot of seed of the above-named grass was through the courtesy of the Agricultural Department of Canada supplied to this Department last year. Mr. James Fletcher, the Botanist of the Central Experimental Farm at Ottawa, in forwarding the seed wrote:—

This has been under test for ten years at this farm and for seven years at the experimental farms at Indian Head, N.W.T., and Brandon, Man., where it has proved very valuable both for hay and pasture. A plot of this grass at Indian Head produced in 1823 at the rate of 3 tons 1,200 lb. of cured hay per acre; in 1894, which was a very dry year, the yield was 2 tons 100 lb. per acre; in 1895 five acres yielded 14 tons, being an average of 2 tons 1,600 lb. per acre, and in 1896 the crop was 2 tons 1,000 lb. per acre. The Awnless Brome has also proved very satisfactory in many other parts of the Dominion where it has been tried.

Directions for Sowing.—Sow at any time convenient in Canada from April 15th to May 15th, on fallow or other clean cultivated land, at the rate of from 15 to 18 lb. of seed to the acre. Each quantity of seed sent (one pound) will, therefore, sow a plot of 50 feet by 50 feet. Where winds are troublesome, it is safer to sow the seed on stubble land immediately after ploughing. Sow by hand and harrow in well. Keep down weeds the first season by mowing or pulling, so as to prevent them from going to seed.

This grass will not produce a full crop until the second year after sowing, when, if desired, it may be allowed to ripen its seed, for which purpose it should be cut with a binder and allowed to dry in bundles, and, when dried, the seed may be threshed out with a flail or with an ordinary threshing machine.

(Sgd.) JAMES FLETCHER.

The annexed copy of a report by Mr. H. G. Flanagan of Prospect Farm, near Komgha, will be of interest to agriculturists in showing the capabilities of the grass:—

On the 3rd September last I received from you 1 lb. of Awnless Brome (*Bromus inermis*) grass seed for experimental sowing. The seed was sown on the 17th September in drills one foot apart in well cultivated garden soil, and having rain at the time the seed germinated well. Subsequent to this date, however, a spell of dry hot weather set in, and before the young plants could establish themselves, with the result that about 70 per cent. died off. When rain came later the surviving plants started to grow vigorously, and under the favourable conditions prevailing since, the grass has continued to make a luxuriant growth, and some of it has even flowered.

The grass now stands from 15 to 18 inches high and has spread or stooled in proportion. The quantity of hay at my disposal has been too limited to enable me to test its feeding qualities; but judging

from its rich, succulent, healthy appearance I do not think that there can be any doubt about its nutritive properties. I am very pleased with the growth and the appearance of the grass, and it is certainly the most promising thing I have yet tried for hay making. Several farmers who have seen it growing have been impressed with its healthy appearance, and most anxious to obtain seed.

Should the Department have any more seed for distribution, I shall be pleased to receive a further supply, and give it a more extended trial.

(Sgd.) H. G. Flanagan.

Medeah Wheat. Thirteen Bushels per Acre.

In a report made on one of the parcels of seed wheat supplied by this Department, the area of the land sown is given as well as the resulting yield, together with other interesting particulars. The trial was made in the Strandveld, Ratel River, Bredasdorp Division.

One muid (200 lb.) was sown at the end of May 1900 on two plots of land, one being 125 yards long and 95 yards wide, and the other 300 yards long and 15 yards wide, containing together an area of 16,375 square yards, equal to nearly 3½ English acres or 1½ morgen and 1,009 square yards. An English acre contains 4,840 square yards, and a morgen 10,244. Having these measurements of the land, as well as quantities of grain, we are able to learn the quantity of seed sown per acre or morgen, as also yield of crop. The seed was sown after the rate of 57 lb. per acre and 125 lb. per morgen. The total yield being estimated to be 14 muids, which is 13½ bushels (60 lb.) per acre or 9 muids per morgen. In nearly all countries the customary method of estimating or reporting on crops is by the acre, or morgen, or whatever may be the common land measure of the country. This crop grew very strong, and was five to six feet high. All the soft wheat in the Strandveld suffered badly from rust, but very little or any of the hard wheat. There was a little appearance of rust on the stalks growing in a damp corner of the lands, but of no consequence to the yield of or quality of the grain.—Editor.

STOCK FARMING.

The Malarial Catarrhal Fever of Sheep.

This is a specific fever peculiar to sheep characterized by catarrhal inflammation of the mucous membranes lining the mouth, lips, and the whole of the air passages, with a more or less catarrhal condition of the mucous membrane lining the whole of the digestive tract, accompanied by a high temperature, varying from 104 to 107 degrees Fah. and great nervous prostration. The symptoms are, first, a congested appearance of the visible mucous membranes, which line the mouth, nostrils and eyelids, with a rise of temperature, and a dull feverish appearance; this is quickly followed by a discharge of mucus, which gradually becomes thicker and adheres to the lips, nostrils and eyelids. Swelling of the sub-mucous tissue occurs with rapid shedding of the epithelium, followed by excoriations and ulcerations on the surface of the mucous lining of the nostrils, lips, and on the surface of the tongue. The lips, cheeks and tongue become greatly swollen, the latter often presenting a purple colour, hence one of the names given to this disease by the Dutch farmers—Bluetongue.

The skin also partakes in the inflammatory action, especially about the legs and feet. Acute inflammation of the coronary band and laminæ of the feet is a common accompaniment, followed by suppuration and shedding of the hoofs. In other cases there is extensive exfoliation of the epidermis, and the fleece peels clean off from the whole body. During the acute stage, the sheep lies almost constantly if not disturbed, and generally with its head doubled round towards its side; so persistent is this position maintained by some patients that after recovery the neck remains permanently twisted. In some localities the disease is much more virulent than in others, and the mortality correspondingly heavier. It is a disease peculiar to sheep, no other species of animal being affected as far as I know. It is not spread by infection, but appears to be indigenous to certain localities. In very dry seasons the disease is much less prevalent, and is confined mainly to low lying districts, while in seasons during which there has been an abundance of rain, it prevails over a very large area of the Colony, even in the valleys and plains at an elevation of four or five thousand feet above sea level. The conditions under which it arises are similar to the conditions which give rise to horse-sickness; the disease is contracted when the sheep are exposed to the night air, more especially during the prevalence of heavy dews. Like horse-sickness, this fever of sheep is rarely seen on high mountain veld, but is confined to the valleys and plains. It is the local elevation, however, which gives the immunity, and not the absolute elevation of the locality above sea level. It is just as preva-

lent some years in the kloofs and valleys of such districts as Murraysburg and Richmond, as it is in the valleys of Fort Beaufort and Bedford, although the former are over two thousand feet higher than the latter. In a similar manner, if the sheep are collected before sunset and kraaled on the top or sunny side of some small hill in the neighbourhood, and not allowed out to graze in the morning until the sun is well up, they are very rarely affected, while complete immunity can be secured by placing them in a proper shed during the night. Further, if a flock of sheep in which the disease is prevalent are dipped in Cooper's, MacDougall's, Little's, Quibell's or some of the other sheep dips, the dipping arrests the further spread of the disease at the time. How long this immunity after dipping lasts I have not sufficient evidence to say; that is a point well worth the careful observation of the farmers.

It is from a consideration of all these facts relative to the nature of the disease, the conditions under which it arises, and the means by which it may be prevented, that we have given it the name of malarial catarrhal fever. The question is, What is Malaria?

The meaning of the word is simply "bad air," and until recent years it was generally considered to consist of certain gases of a poisonous character which were generated in the surface soil of certain marshy localities by the decomposition of vegetable matter. But recent investigations have clearly shown that the originating cause of malarial fever in man and many of the lower animals is certain micro-organisms which gain an entrance into the blood of the patient, and I entertain very little doubt that this catarrhal fever of sheep will ultimately be found to have a similar origin, as it possesses all the characteristics of a specific disease.* It is readily communicated from an affected sheep, to a healthy one, by intravenous and subcutaneous injections of a small quantity of blood, its period of incubation being about six days. In the meantime we should—as far as practicable—apply the information which we already possess respecting the conditions under which it arises, to its prevention and cure.

I have already referred to the preventive effects of placing sheep in properly constructed sheds or kraals on an elevated position and of dipping them in certain germicidal and vermicidal solutions. It is worthy of consideration, therefore, whether small doses of such, substances as Cooper's powder and tar, mixed with salt and given to sheep as a lick, would not exercise a similar preventive effect against the development of the disease.

Many sheep farmers have been in the habit of mixing tar with the salt which they have given to their sheep for some years, and with excellent effects, both on the general health of the flocks, and as a

* Since the above was written, Veterinary Surgeon William Robertson of this Department has had his attention directed to this disease, and in his microscopic examination of the blood of sheep affected, he has found certain bodies of a crescentic shape resembling one of the forms of the malarial parasite of man. He is continuing his examinations along with some experiments with the object of ascertaining what relation these bodies bear to the disease.

preventive of parasites. The sheep take to the mixture very readily when once they get acccustomed to it, wherever they are eager for salt.

Cooper's powder has for many years been successfully used as a preventive of Gielziekte, and I have a growing conviction that repeated doses of a mixture of arsenic and sulphur exercise some preventive effect against "horse-sickness." It may, therefore, act as a protection against catarrhal fever in sheep also. At any rate the addition of some of these germicides to the salt given to sheep where this disease prevails is worthy of a trial.

Treatment.—With respect to curative remedies, Mr. Walter Rubidge believed that he had discovered a cure for this complaint in chloride of ammonia. He gave from ten to twelve grains dry on the tongue, but subsequent experiments did not support its claim to be an effective remedy. Veterinary Surgeon Soga reports that he was very successful with a mixture of

Corrosive sublimate,	...	half a grain
Calomel ...	...	one grain
Epsom salts ...	...	one ounce

in a cupful of water, and repeated daily.

This, however, is a mixture which would require great care in preparing and using. I have found the following treatment fairly successful. Give first about ten grains of calomel laid dry on the back of the tongue, then give the following mixture two or three times a day:—

Powdered chlorate of potash	...	half a teaspoonful
Tincture of aconite	...	five to ten drops
Warm water ...	...	a small cupful,

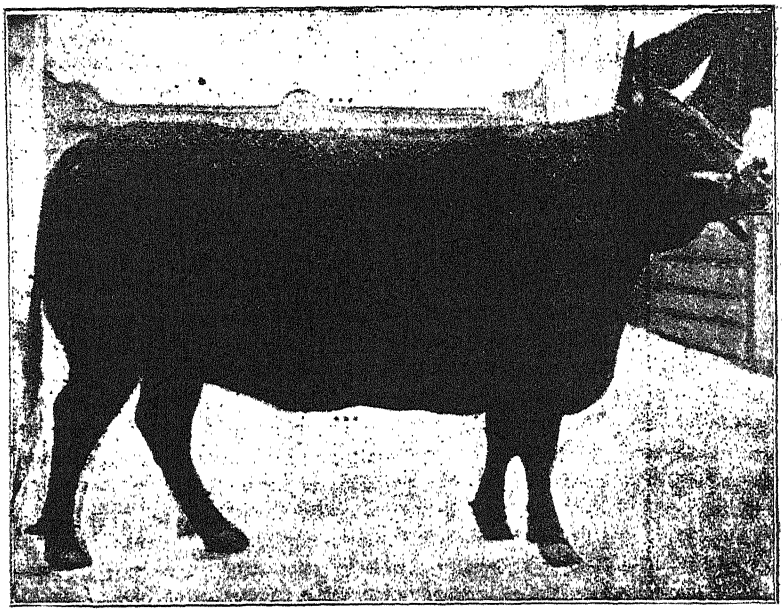
and apply a mixture of Stockholm tar and sulphur as a dressing to the mouth and lips. Giving a dose of tar and sulphur daily is also considered very beneficial. From one to two ounces of Epsom salts should be given the day after giving the calomel to move the bowels gently. Many farmers clean out the mouth with a spoonful of common salt placed in the mouth, and follow this up with two ounces of Epsom salts in solution, while others give a teaspoonful of Little's, MacDougall's or Quibell's sheep dip, dissolved in a cupful of water. A teaspoonful of turpentine given in a little oil or milk, and repeated daily, has been favourably reported upon. It is probable that quinine would be useful in reducing the temperature, if not in directly attacking the originating cause.

But whatever medicines may be given, it is of the greatest importance that the sick sheep should be disturbed as little as possible. If practicable the patient should be placed under cover, or in some shaded place where it can be easily and quietly handled. But if the sick animal is found a considerable distance from home, it should not be driven, but either carried, or conveyed in a cart. Driving such an animal any distance during the acute stage of the fever, does it a great deal of harm.

Veterinary Surgeon Soga recommends that the feet should be pared down, and blood drawn from the toes to prevent the subsequent sloughing of the hoofs. I strongly recommend that the hoofs be frequently pared down level, as they have a tendency to grow fast and irregular not alone during the fever, but during convalescence. I have some doubt, however, as to any benefit arising from drawing blood from the sole, but drawing a little blood from the jugular vein does good.

D. HUTCHEON, C.V.S.

Sussex Cattle.



SUSSEX HEIFER, MELODY.

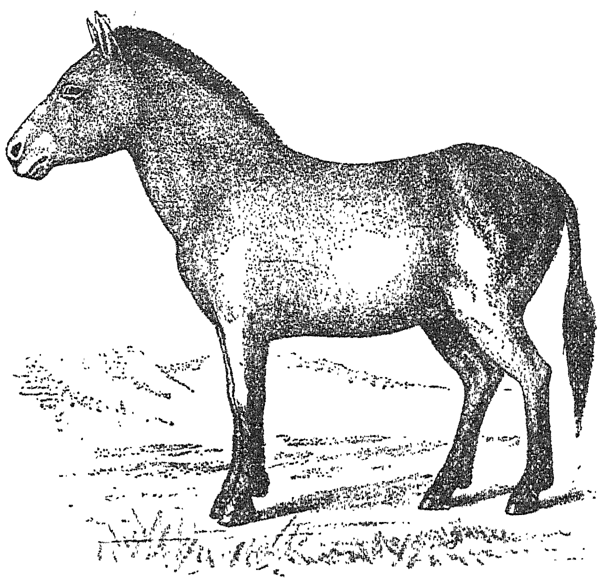
This breed of cattle is believed to be descended from the cattle of the ancient Britons in the days of the Roman invasion, the Devons, Herefords and some Welsh breeds claiming the same ancestry. These old British cattle would be the same as those of Western Europe in early times, and in this way we account for the relationship existing between the Devons and Afrikanders, the latter having been brought to South Africa by the Portuguese. The Sussex cattle are heavier then the Devons, but they have many points in common, amongst the rest, their famous beef qualities.

On the subject of the illustration the *Mark Lane Express* records :—

"At the Smithfield Show Melody was first in the class for Sussex heifers not exceeding three years old, and also won the £25 silver cup for the best animal of the breed. This heifer was shown with success at various of the summer shows, winning amongst other prizes a first at the Royal Counties and a second at the Royal and Bath and West Shows. At the first mentioned she was reserve for the champion cup for the breed."

She appears to be a good representative of the breed, possessing good form and flesh and carrying a full proportion of beef in the most valuable portions of her carcase.—EDITOR.

A New Species of Horse.



PREJEVALSKY'S HORSE.

Relative to this interesting and unexpected discovery, Mr. Tegetmeier writes to the *Live Stock Journal* as follows :—

"The circumstance that so large an animal as a new species of horse should remain unknown and undiscovered until some five-and-twenty years since would appear almost incredible, had not the celebrated Russian traveller Prejevalsky, exploring some of the unknown districts in Asia, obtained a specimen—at that time the only one known—of a singular equine animal that had been captured by the wild camel hunters in the deserts of Central Asia. A drawing of this animal was published in the account of his travels, and the specimen was described at length by a well-known Russian naturalist Poliakof, in the Proceedings of the Russian Geographical Society for

January, 1881, which was afterwards translated and reproduced in England. This specimen, remaining in the Zoological Museum of the Imperial Academy, St. Petersburg, has not become familiar to English or French naturalists. At a recent meeting of the Zoological Society, Mr. Sclater called attention to a very fine specimen of this horse, which is now in the Gallery of the Museum of Natural History in Paris, and open to the inspection of all visitors to that capital.

Prejevalsky's horse appears undoubtedly to be a new and distinct species. As will be seen by the engraving, it has much shorter ears than any species of ass. In shape it resembles the horse, having thicker legs than the ass, and broader and rounder hoofs. The colour is dun, with a yellow tinge on the back, and without any stripe down the centre of the spine. It is almost white under the belly. The hair, which is long, is brick-red on the head, cheeks and jaw, but the muzzle is white, and in strong contrast with the red of the other parts of the head. There is no forelock, but an upright hogged mane, extending to the withers. This mane is of a dark brown colour. The tail is thicker at the root than in any of the asses, and is clothed with long, dark brown hair at the extremity. Poliakof calls attention to the legs being brown near the hoofs, a character which he says never occurs in the wild ass.

Since the first discovery of this horse other specimens have been obtained by two Russian travellers, the brothers Grijimailo, whose account has been published in the Proceedings of our own Geographical Society for 1891. They claim to be the first Europeans who were able to make a study of this interesting horse; and they obtained the skins of several specimens. Studying the animal in its native locality, the brothers seem to have had no doubt that it is a perfectly distinct species, and not a hybrid or mule. They regarded the specimens as being amongst the most valuable of any that they obtained in their expedition. They selected several skulls and one perfect skeleton, and they had not the slightest doubt of the animal being a perfectly distinct species, and not an accidental production."

HORTICULTURE.

Stock for Japanese Plums.

In response to a resolution passed at the Annual Congress of Fruit-growers held at Stellenbosch in May last year, enquiries have been made by the Government into the comparative merits of peach and myrobolan stocks for Japanese plums; and the annexed reports by Mr. Mayer and Mr. E. Pillans, Agricultural Assistants, embodying the information that has been obtained, are published hereunder ;—

ANNEXURE I.

Mr. Mayer reports as follows :—

Stock for Japanese Plums.

Though Japanese plums have been cultivated in America for over twenty years, their introduction into this Colony is a rather recent event. The variety Kelsey appears to have been grown for a considerable number of years but it never spread beyond certain limits, and Japanese plums generally were practically unknown here until about six or seven years ago, when, principally through the agency of Mr. H. E. V. Pickstone, an assortment of different varieties were brought in and widely distributed throughout the Colony and other parts of South Africa.

In collating particulars in respect to the cultivation of these plums I must from the outset remark that my observations refer, so to speak, exclusively to the Western fruit districts, as I had no opportunity given of studying them in any other part and failed to elicit information from Eastern growers justifying inferences in regard to the adaptability of Japanese plums to Eastern conditions.

Japanese plums have, as remarked in the beginning, been cultivated in the Colony for about six years on a fairly large scale. The interest taken in that kind of fruit by practical growers is illustrated by the discussion and resolution passed at the last Fruit-growers' Congress in May 1900, urging an enquiry into the suitability of the various sorts and the comparative merits of the peach and myrobolan plum as graft-bearers.

Before entering into details and dealing with the several varieties individually, I may state that some sorts have been found unsuitable and can no longer be recommended for cultivation.

This fact, however, does not detract much from their general usefulness and ready adaptation to Western conditions, as is the case with the more prominent sorts. Compared with the ordinary or Dimestra plum, Japanese plums are less precarious. There is none of the slow, unhealthy growth and the backward condition of trees known to exist among certain varieties of the Dimestra type, planted about the same time as their Japanese brothers. On the contrary, they make as a rule strong, vigorous, healthy growing plants and excel in early and great productiveness, ready adaptation to local conditions and comparative freedom from disease and insect pests. Their fruit, though inferior in quality and therefore less valuable for table purposes than the ordinary plums, enjoys good keeping properties and great beauty of appearance.

The Japanese plums will therefore never drive other plums from the field, but the above qualities are so marked that they will secure these plums a permanent place on the record of fruits, which can be confidently recommended for cultivation both to the large as well as the small grower. It is their great and early fertility which makes them valuable to the small grower, who has to look to quick returns

and for the same reason they are welcome to the large grower, as they may be used for planting between pears, provided upright growing kinds are selected. By adopting that system pear orchards known to take a good number of years before they come into bearing, may be made to yield from their third year appreciable returns until the pear trees commence to yield. With the proper system of planting and the selection of the proper kinds there seems to be no reason why this joined cultivation of pears and Japanese plums should not be continued for close upon ten years.

In their adaptation to local conditions they have been found to do excellently in all such parts where no summer rains fall, or in moderation, whereas their suitability to districts with plenty of summer rain and none in winter is as yet not thoroughly established. The little information I obtained from these quarters seems, however, to indicate that, at least in certain localities of the East, such trees suffer apparently during winter and do not start well in spring.

With regard to the comparative merits of peach and myrobolan stock as graft-bearers for Japanese plums, there is, taking matters for the present on a broad basis and leaving specific cases out of question, plenty of evidence that both may be used. The selection of the one or other depends, however, primarily on the nature of the soil. For peach is suited to well drained light sandy and even rather dryish land, while myrobolan undoubtedly likes a certain amount of freshness and even a little dampishness, but does not succeed satisfactorily on even slightly wet soil. In respect to the latter stock, I observed in several instances an existing uncongeniality between graft-bearer and tree. This uncongeniality is more pronounced with some varieties than with others and is particularly noticeable in the Burbank and Simoni. With others, again, it is practically immaterial whether they are worked on peach or myrobolan, provided the stock most suited to the land has been selected. Where such uncongeniality exists, the trees are as a rule less vigorous than on peach, yielding, however, an abundance of fruit, in consequence of which the individual fruit is frequently undersized, unless trimming has been practised. In addition, myrobolan grafted trees send up year after year numerous sprouts or suckers from their roots, whereas peach grafted trees are practically free from this annoying tendency. I am therefore personally persuaded that, where locality and climatic conditions are suitable to peach root, peach root grafted Japanese plums are decidedly preferable for permanent plantations, whereas for planting into newly laid out pear orchards myrobolan grafted trees should be used by reason of their somewhat less vigorous growth, and their earlier and more abundant fertility.

Varieties of Japanese Plums.

Though Japanese plums appear from the foregoing to have, generally speaking, given satisfaction, it will be readily understood that a selection of varieties is as important as with other fruits. It is well known how individual members of a plant family, in this case

sorts or varieties, are differently gifted in respect to productiveness, resistance to disease, and similar other properties important from a point of practical orcharding. It is therefore proposed to give hereunder a description of the different kinds, under statement of results obtained within the Colony.

Botan or Abundance. Fruit medium size, globular to globular oblong, yellow with bright pink red; sometimes the entire surface is reddened. Flesh yellow, very juicy, with a distinct musk flavour. Ripens earlier than any other variety of Japanese plums introduced here. Fruit does not set firmly, and drops easily. Tree strong, vigorous, upright grower. Its fruiting properties are at variance. In some cases the trees have yielded a fair return, in others they have failed to give satisfaction, and several growers have worked their trees over. Though it is certain that this variety is less productive that other Japanese plums, it would be rash to offer any conclusive remarks on its general suitability, and it is advisable to await further developments. It does well on peach and on myrobolan.

Burbank. Fruit oblong to round, orange yellow overlaid with a dark cherry red, which frequently covers the whole fruit when fully mature. Fruit ripens a week or two later than Botan. The tree is an exceedingly flat topped, sprawling and even drooping grower, requiring careful heading to keep it well in shape. It is productive, and exceeds in this respect all other sorts of Japanese plums cultivated in this Colony. On myrobolan it makes a much smaller and presumably shorter lived tree than on peach.

Ogon Magate. Some confusion exists in the nomenclature of Yon Magate and Shiro Smomo, as I found both names being used for the same kind of plum. The kind so confused is a medium-sized globular to round fruit, flattened on the top, of a clear lemon yellow, with a whitish bloom. Flesh hard with a peculiar musky flavour, ripening soon after Burbank. The tree is a sturdy but moderate grower with a foliage resembling that of Burbank, and satisfactorily productive.

Satsuma. Fruit medium to large, with blood-red flesh, ripening later than any of the foregoing. Tree strong, vigorous grower, somewhat shy bearer when young. Most growers consider this variety useless on account of its red flesh, in consequence of which it is little suitable for table or jam-making purposes.

Kelsey. Fruit very large, long pointed tapering, colour bright red on a yellow ground, ripens end of February. In some seasons it colours more than in others. The flesh is yellow, firm, and of a pleasant flavour when fruit matures well on tree. The tree is a free upright grower, forming long willowy shoots, and has given general satisfaction. I am inclined to think that in permanent plantations it should be put a little closer than twenty feet, as it apparently suffers from high winds. On account of its growing habit it is well suited for planting between pear trees. It is more than any other Japanese plum, cultivated here, subject to shot-hole fungus, and must therefore be regularly sprayed with a good fungicide.

Simoni. Fruit medium to large, of a brick red colour, with a very

distinct flavour of its own, which by many is not liked. It is an upright grower with a large number of long willowy shoots and flourishes on peach much better than on myrobolan. In this and in the adjoining divisions it has so far proved to be an exceedingly shy bearer, and its fruit liable to split just as it ripens; whereas it has been found to answer better in the inland parts beyond the influence of the sea and less subject to summer rains.

Yosebe. This variety is also erroneously called Tasobe in the Colony. Fruit medium, round oblong, of a pink red with a bright bloom. It resembles the Burbank, but is generally smaller, of lighter colouring, and drops readily from the tree. It is of a rather inferior quality and can therefore not be specially recommended.

(Signed) C. MAYER,
Agric. Assistant.

ANNEXURE II.

Mr. Pillans states :—

STOCK FOR JAPANESE PLUMS.

I shall deal merely with such sorts of the Japanese plums as have been generally grown in this country for the past five years. First, —as to the comparative merits of peach and myrobolan stocks for Japanese plums.

The remarks here made regarding these apply equally to the Eastern and Western Province. On stiff and heavy soils I consider that the myrobolan stock has proved itself suitable to carry the Kelsey, Satsuma, Botan and Yosebe plums. But this stock does not appear to suit Burbank, although the junction between scion and stock appears to be as perfect as possible. Kelsey and Yosebe both do well on the myrobolan stock on light and heavy soils, particularly where the former soils are at all fertile. In fact little or no difference can be distinguished between the Kelsey and Yosebe on myrobolan or peach stock.

Generally speaking though, it is advisable to work the Japanese plums on peach stocks where they are intended for planting out on such soils and sites as suit the peach, and on the myrobolan stock when dwarf trees are needed for localities that suit that root.

The experience of the growers will guide them as to what stock they should ask their nurseryman for to suit the locality in which they intend to lay out such plum orchard. The myrobolan stock is certainly not to be recommended for Japanese plums to be planted out in *heavy, low-lying wet soils,* of which a good percentage of our Western orchard soils consists.

Second,—as to the suitability of the Japanese plums to the various districts of this Colony. The varieties Botan, Burbank, Ogon Magate, Satsuma, Shiro Smomo and Yosebe are doing well in all parts of the Colony where they have been placed, and are specially adapted for the Eastern Coast belts of the country. The variety Simoni is only to be recommended for the Karoo districts and the Eastern Province uplands. (Signed) E. PILLANS.

Cultivation of Oranges.

In connection with the article "Grafting Oranges on Bitter Seville Stocks," published in the *Agricultural Journal* of 28th ultimo (No. 7, vol. xviii., p. 423, *et seq.*), the annexed extract from the Annual Report of Mr. Tidmarsh, the Curator of the Grahamstown Botanical Gardens, for the year 1900, will be read with interest:—

"Several of the Albany growers of oranges have been able, in face of many drawbacks, due to drought and locusts, to draw certain conclusions as to the value for their purposes of sundry varieties of this tribe of fruit; and no doubt each year will add to this knowledge, valuable not only to the fruit-farmer but to the nurseryman, who will of course follow the lead thus given to propagate those sorts found most suitable to the climate and markets. Already it is becoming clear that various of the new kinds of oranges imported by the Grahamstown nurserymen are destined to hold a first place in the markets; not forgetting, however, that a good strain of the old Cape variety may suit some conditions of climate better than the last imported sorts.

The Washington Navel orange has been much written about. We have, however, yet to learn if this variety of the Navels will hold the position in this climate that it is reported to do in California. Even in Florida it appears to hold a second rank, owing to the effect of climate, on which, as with all fruits, much depends.

These curious oranges apparently originated in Brazil, there called "Lavonga de Ombigo," the equivalent of our "Navel Orange," and were first imported into America about the year 1870, but were fruiting in Grahamstown years before that, having been imported from Bahia by the late Mr. Brehm, of Uitenhage, not later than 1853, as I am informed by Mr. W. Tuck, who at that time had the management of the garden and nursery of Mr. Brehm. Young trees grafted from these imports reached Grahamstown about 1856 or so. With the Navel or Bahia Orange, Mr. Brehm also imported the Malta Egg Orange, Malta Blood, and the Tangerine Orange or Naartje. This fruit has a peculiar flavour, and has in consequence been called in this country the Cinnamon Orange. We have in these Gardens, besides the old Bahia Orange, the Washington, Sustain and Embigua varieties of Navel Orange, the two latter not identical with the Washington, but the effect of climate may cause them to become so in the course of years.

Mr. C. J. Stirk, who has planted considerably of the various kinds of newly-introduced oranges, was good enough to send me, for comparison, fruits of a number of sorts growing in his orchard. In my opinion, the most excellent variety was that known as the "Jaffa." Unfortunately, the Jaffa tree requires a very special genial climate, therefore it is not to be generally recommended. Next to the Jaffa for quality came a specimen of the old Bahia, commonly called the

Nipple Orange; and then the Washington and other Navels. These fruits were all of large size, especially the Washington Navel, and probably had these last been as ripe as was the Bahia, would have been equal to that in sweetness and flavour. Other oranges that will no doubt take a high place in the market are the following: Excelsior, St. Michael Paper-Rind, Nonpareil, Dulcissima and Valentia Late.

Of equal importance with the kinds of orange to plant, is the stock they are grafted on. Although the trees certainly grow faster grafted on the rough-skin lemon, it is no longer made use of in this nursery. At present, all the trees grown here are grafted on one of two stocks, each of which has its own peculiarities of growth. The Seville Orange was adopted as a stock in consequence of official reports from various orange-growing countries that this orange was not subject to the gum disease. The other citrus we graft on is, in this part of the Colony, known as "Pamplemousse." Of the disease-resisting properties of this tree we have what appears to be sufficient evidence in the Colony. It is unfortunate that this tree should have become known by the name of "Pamplemousse," which name no doubt belongs properly to the *Citrus decumana*, or Shaddock—a different tree altogether. I understand that our wrongly-named "Pamplemousse" was the stock on which were grafted the citrus trees imported by Mr. Brehm. Suckers of this tree, evidently new to Uitenhage, being allowed to grow up, in due time bore fruit which came to be called the "Rio Preserving Orange," a most suitable name, the fruit being an orange and at present the main source of the marmalade made by our Eastern jam factories. The fruit is appreciated not only by the jam manufacturers, but equally by the purchasers of the marmalade. Probably the tree is one of the numerous varieties of "Khatta Orange" described by Dr. Bonavia in his book, "The Oranges and Lemons of India and Ceylon," where also are described in considerable number the fruits usually named in India "Suntara Oranges," identical with what are known in this Colony as Naartjes.

As some stress has been put on the question of budding *versus* grafting the orange, I may remark that there is not any physiological significance attached to the difference of the two methods. In budding, a small piece of wood, having one bud on it, is inserted under the bark of the stock; and in grafting, a larger piece of the scion, taken with three or four buds, is partly inserted between bark and wood of the stock. The whole question hinges upon the condition of the material to be operated on, and that again depends on the climate. If, as in the West, there fell some forty inches of rain at a time to fill the trees with sap at the working season, the operator would probably elect to "bud." At this end of the Colony, our rainfall, even in good years, is not much more than half forty inches, and usually falls in the summer months, the winter being a dry time; consequently both stocks and scions of citrus are often in a condition more suited for "grafting" than for

"budding." Nevertheless, a considerable number of trees are from time to time propagated by the one-bud method. Letters have appeared recommending for stocks, in the absence of Sevilles, seedlings of the sweet orange. As, however, the much greater number of the old orange groves that have perished from gum disease were seedlings or layers, in either case being on orange roots, it is difficult to discover good reasons for the recommendation of the sweet orange as a stock."

ENTOMOLOGY.

Pineapple Mealy Bug.

Our pineapple growers will be interested to read the subjoined letter from the Queensland Entomologist relative to the mealy bug which infests the pineapple in Australia. A portion of the letter, entirely technical in character, is omitted as it deals only with the specific identity of the insect; from the statements therein made, however, it appears that the South African pineapple mealy bug is identical with the form which occurs on the same plant in Queensland. The *Cryptolæmus* ladybird mentioned has been introduced here and is being colonized in a Bathurst pinery :—

Brisbane, Queensland,
6th March, 1901.

CHAS. P. LOUNSBURY, ESQ.,
Government Entomologist, Cape Town.

Dear Sir,—I am in receipt of your letter of the 15th December relative to the *Dactylopius* occurring upon the pineapple here, and its habits. Although *Dactylopius* occurs somewhat generally in the pineapple plantations of Southern Queensland, its presence therein is seldom a matter of complaint on the part of their proprietors. I am aware, however, that during the prevalence of dry weather it does a certain amount of damage, for at this time individuals descend to the portion of the main stem below the ground and attack the more readily vulnerable portions of the plant. In the northern coast districts *Dactylopius* is more pernicious by reason of the attention bestowed upon it by ants. The mealy bug as a rule congregates at the base of the fruit and between it and the encircling bracts, preferring to work in semi-darkness. And in the part of Queensland to which I refer certain species of *Formicidæ* increase the surface otherwise available for operating on by building a loose wall of

particles of vegetable debris from the base of the fruit some way upwards towards its apex. Beneath this the mealy bugs feed secure, bestowing their sugary excretions upon the ants that in turn protect them from the attacks of their enemies. Thus it happens that the fruit may become much stunted in growth. This consortship with ants on the part of pineapple mealy bugs is a very marked occurrence in some parts of British New Guinea. Thus I have remarked that on the island of Samarai the fruit whilst still but slightly developed is completely covered over by ants with a canopy composed of the above-mentioned substance, and as a result of Dactylopius attack becomes brown and ultimately dry after having attained but quite small dimensions. . . . . It (the Queensland pineapple species) does not appear to be much attacked by natural enemies. *Cryptolæmus montrouzieri* is however somewhat partial to it, and again there are grounds for concluding that it is victimized by the caterpillar of a small moth. Insomuch as it increases but slowly in this part of the State it is probable that further investigation would serve to show that greater results are to be attributed to the operations of its predatory foes than is to be inferred from the direct evidence available. In preventing its appearance growers are advised to submerge suckers prior to planting in ordinary lime and sulphur wash. The use of hydrocyanic acid gas, which would of course constitute a more efficacious measure for the purpose in view, not being always convenient.

I am, etc.,

HENRY TRYON, Entomologist.

Destruction of Locusts.

In continuation of reports published in the *Agricultural Journal*, No. 7, vol. xviii., the annexed communication from Mr. W. R. Ellis, giving the result of his work in the East London Division, is published for the information of our readers :—

"I have the honour to submit my report on the general results of soap-spraying on locusts in the hopper stage.

Thousands of swarms infested this part—Ward No. 7—which appears to be the favourite hatching ground for the coast locust. On their hatching in and about the cultivated lands, the farmers set to work with spray-pumps and soap emulsion and in many instances are still operating. From personal observation and from the general consensus of opinion given by those interested, it is clear that taken at the earlier stage, in fact on their hatching ground, soap-spraying by means of the spray-pump as supplied by Government has proved most effective and has been the means of saving one-half the crops where taken in hand. Dissatisfaction has been expressed by

applicants failing to be supplied with spray-pumps. I have endeavoured to remedy this as much as possible by the system of passing on from farm to farm, but unfortunately this does not work satisfactorily, as swarms hatch out pretty frequently at the same time, and the pumps are consequently in demand by half a dozen at once.

Numerous swarms are still to be found on commonage and veld. The farmer having destroyed those menacing his crop, is not seemingly much inclined to follow them up in the veld, a mistaken policy, for which he will suffer; when they attain the winged stage and sweep down, of course his crops must suffer.

Personally I have used fungus in various parts, but the farmers have been unable to give me any single result, as, unfortunately, they have operated on them with soap afterwards, not giving the fungus time to develop. I have a swarm treated with fungus in the Kwelera Location and anxiously await developments.

In conclusion I may state that the coast locusts may be locally wiped out by the soap and spray-pump process, provided, however, the matter is legislated on; and with a compulsory Act, properly administered, the country could in due course be freed from this scourge."

W. R. Ellis, Chairman, Locust Board.

Braakfontein, 30th March, 1901.

MISCELLANEOUS.

Preventing Damage by Hail.

Successful experiments of firing cannon to prevent damage by hail have been occasionally reported. One of the latest notices is thus reported in the *New York Weekly Journal of Commerce*:—

"United States Consul Covert, at Lyons, France, has informed the State Department that the Congress of delegates held at Padua, Italy, to consider the question of firing cannon at clouds to prevent the devastation of hail among the wine growers of France and Italy, has adjourned. The reports presented to the Congress by the wine growers were all in favour of the efficacy of the use of cannon.

By an almost unanimous vote it was resolved that the firing of cannon stopped the movement of hurricanes; that the lightning and thunder ceased; that rain or melted snow immediately began to fall and the clouds passed away when attacked by the storm artillery."

We do not know whether any such like experiments have ever been tried in this country, and we should like to get the opinions and

experiences of our fruit and vineyard proprietors as to its probable success. However, such are the interests involved that there is little doubt the French will follow up their experiments.

Engineering says that though hail showers occur all over the globe they are particularly common in the temperate zones, and are more dreaded on the Continent than in the British Isles. If more grain were raised in this country, more attention would probably be paid to hail showers. Some years ago England had three insurance companies against hail, Italy ten, France twenty, and Germany twenty-four. Attempts to disperse threatening hail clouds by directing cannonades against them have been made at different times. In recent years the United States seem to have taken the initiative again. The attempts have not always been successful. To make up for failures in some instances, however, more hail and rain have been brought down occasionally than were bargained for. On the Continent, Burgomaster Stiger, of Windisch-Feistritz, in Styria, is credited with having first attacked the problem in a scientific manner in 1896. The first Hail Congress was held at Casale, Italy, in 1899; a second followed last autumn. Italy was in 1899 supposed to possess 2,000 hail gun stations, and was, according to Jean Sigaux, expected to have 16,000 stations by the end of 1900. The term "station" is presumably somewhat elastic. In many cases one gun may constitute a station, and not many of these guns will be of the special type which the Congresses have recommended. In France the famous vineyards of Beaujolais lie on a regular hailstorm track from the south-west, and the community of Denise in that district is now protected by a battery of fifty-two guns. When suspicious clouds are observed, a flag or gun signal is given, and the cannonade opens with the guns which the storm would first reach in its advance. At first two shots are discharged every minute; afterwards the fire proceeds at a slower rate, and is continued, though hail and lightning may come, until the storm has dispersed. The French Government assists in protecting the vineyards by supplying the powder on exceedingly moderate terms. Sigaux estimates that a station, comprising one gun, twenty charges, a hut, etc., would cost about 230 francs—less than £10. The success of these cannonades is no longer doubted.—EDITOR.

Potato Blight and "Vrotpootjes."

The two following memoranda on Potato Blight and "Vrotpootjes" are reproduced from vol. iii. of this journal :—

SALTS OF COPPER AND OTHER REMEDIES FOR THE POTATO DISEASE, COMMONLY CALLED "BLIGHT."

As solutions of blue vitriol have successfully been applied in France to a vine disease (*Peronospora viticola*) which is somewhat related to the blight in potatoes (vrotpootjes), several experts have tried this remedy with good results on infected potato crops. The experiments have only lately been conducted. The reports, however, are favourable without exception. Besides bluestone, green vitriol also has been experimented with in two cases. Subjoined are the results of these investigations :—

Experiments with Sulphate of Copper.—There are especially three mixtures which are recommended for application :—

1. *The original Bordeaux Mixture* (Bouillie Bordelaise), prepared as follows :—Dissolve 8lb. of pure sulphate of copper in ten gallons of water ; this is best done by heating up a part of the water, and after all is dissolved the remaining cold water is then added. In another vessel 15lb. of good burnt lime (not slaked) are mixed with 3 gallons of water ; stir well on adding the water, no lumps should be left at the bottom. Pour now the creamy lime mixture slowly, whilst stirring, into the blue solution of the copper salt prepared before. Never pour the bluestone solution into the lime mixture.

2. *The reduced Bordeaux Mixture.*—This has given highly satisfactory results. It is prepared in the same way as the first mixture, but only 3lb. of bluestone and 3lb. of lime are taken to 10 gallons of water.

3. *The Copper Solution.*—Mr. Bûngli was very successful in using this mixture ; it should contain 2lb. sulphate of copper and 3lb. soda in 10 gallons of water. There is no difficulty in preparing the solution. Dissolve the salts first in some warm water and fill up with the cold water.

Remarks and application.—The lime used for preparing the mixtures should be of the best quality; there will often be some difficulty in procuring such. The lime which we get at Stellenbosch from Somerset West Strand must necessarily be sifted before using for this purpose, and even in this case it will not be very reliable, and under any circumstances one should use a larger proportion of it. In this lies the advantage of remedy 3. These chemicals may easily be obtained in a pure state. It appears from various reports that the above remedies must be applied two or three times in the season. The first time should be as soon as the potato sprouts emerge from the ground and the plants are about two or three inches high. The second application is made when the plants are near maturity,

say one month before taking the potatoes out. 40 to 60 gallons of one of the above mixtures seem to be required for each application. I do not think that three applications are necessary in this country, the time of growth being shorter than in Europe. A fine water sprinkler or good fine syringe is all that is required to apply the remedies; but see that the leaves get covered with the mixture.

4. *Green Vitriol* (Sulphate of Iron).—It has been stated lately, by several parties, that this substance also when used as a kind of manure may prevent the potato disease. Griffith recommends 90lb. of sulphate of iron to be applied to one acre when the potato sprouts begin to appear. It seems that the iron salt is best applied in solution, by dissolving 40lb. in 10 gallons of water and taking of this mixture 2 pints for each common watering-can full of water. It is also stated that the sulphate of iron forms a good dip for potatoes before planting. I think this should be accepted with caution, as hundreds of experiments have been made and nothing yet found which can be successfully used for treating seed potatoes in order to prevent blight. All the above-mentioned experiments, however, are so encouraging that further trials should be made by those engaged in the cultivation of potatoes, and suffering damage from disease in that plant.

(Sgd.) F. BLERSCH.

REMEDIAL MEASURES AGAINST THE POTATO DISEASE.

Dr. C. B. Plowright, a distinguished English mycologist, has been delivering a series of lectures upon the Diseases of Plants through the presence of fungi. It is to be hoped that this excellent *résumé* of the subject will ere long be published separately. Meanwhile a few paragraphs taken from the report in the *Gardeners' Chronicle* will be interesting and indicate the value of the whole. As the protective system of deep moulding, introduced into potato culture by Jensen, has several times been referred to in these pages, and still oftener in correspondence, here follows the lecturer's explanation of its remedial value.—(Sgd.) P. MACOWAN.

"The idea that some drug or chemical can be applied to the potato plants as soon as they evince symptoms of the disease, which shall arrest its progress and not injure the plants, is the panacea which every cultivator longs after. With the mycelium working its way along the interior of the plant, and throwing up at frequent intervals its myriads of conidiophores, such a remedy seems past hoping for. Yet there are certain circumstances connected with the culture of the potato plant, which, when rightly understood and appreciated, enable the cultivator to assist to a great extent the ravages of the disease. Judging from the way one often sees potatoes grown and gathered, it might be thought the old proverb about wilful waste making woeful want had lost its truth. An immense number of potatoes are lost every year that the disease is prevalent merely through ignorance of the fact that perfectly healthy tubers become diseased from spores that fall on them after they are taken out of the ground. On the

Continent this is well recognized, and is the condition which Jensen terms "after-sickness." The explanation is simple enough. Where the tubers are just dug up, the skins are tender and moist. The moisture is quite enough to set the disease, conidia, germinating, and the skin is tender enough to let the growing fungus-tubes penetrate. Anyone may convince himself of this by the simple experiment of dividing a given quantity of freshly dug tubers into two lots—dashing one lot with a handful of diseased potato haulm, and keeping the other separate for comparison. At the end of four to eight days, those tubers to which the conidia were applied by dashing the diseased foliage on them will be distinctly infected: the other tubers will be sound. Now it is exactly this after-sickness produced by want of care that causes immense loss. It can be obviated by either not lifting the crop till the foliage is thoroughly destroyed, or, if it be necessary to lift the crop before this takes place, by cutting off the haulm, and removing it before the tubers are taken out of the ground. While they are under the surface, those that are unaffected by disease are safe. But as soon as they are brought into an atmosphere full of conidia they are exposed to almost certain risk of infection.

When the conidia germinate, they produce zoospores, or "swarm-pores," which move about for a time on the wet surface of the plant. The dissemination of the disease must therefore to a great extent depend upon moisture. Without a thin film of moisture the swarm-pores cannot travel. The amount of fluid they require is small, still their mode of distribution is rather aqueous than aerial. It is by rain-drops that they travel from one part of a leaf to another; it is by rain-drops trickling down the stem that they are washed through the soil down to the tubers. Nor are they mere passive agents. By the action of their cilia, they wriggle themselves about, and especially, by this motion, work themselves into the soil till they reach the tubers.

The mass of potatoes becomes diseased in three ways, either, as has been just pointed out, during the operation of lifting, or by the zoospores being washed down the stems, or by their making their way through the earth to the tubers. Hence it follows, that in the last case, which is the most common, the thicker the earth covering the tubers have, the better they will be protected. Practical men have long ago observed that some sorts of soil protect the tubers better than others. Potatoes grown in sandy soils are less liable to disease than those in heavy soil.

This is because by its physical structure, sand forms not only an effective filter in which the zoospores are retained, but also adapts itself readily to the shape and form of the growing tubers. This last point is an important one. What it signifies is this, in a heavy clay soil the rapid growth of the tubers causes the soil to crack by their expansion in bulk, while in light soil this cracking rarely takes place because the sandy particles slip among themselves and are adapted to the growing tubers very readily. At first sight it seems difficult

to understand how so porous a medium as sand should filter out such minute bodies as the zoospores, smaller than the grains of sand themselves. But it must be borne in mind that it is not the size of the sand grains, but that of the interstices between them, that has to be considered in determining the efficacy of the filter. Besides, they are not of uniform size. Some few years ago, when this subject was first mooted, I conducted a series of investigations upon the manner in which sand acted as a spore filter. What happens is this: When the rain falls upon a sandy surface, each drop mechanically disturbs the position of the sand particles, these being momentarily suspended in the rain-drop.

Now the shaking of a number of bodies, free to move among themselves, causes the larger ones to come to the top, as when a basket of apples is shaken. We may regard the effect of a rain shower, then, to be to lift up and for an instant to hold in suspension a thin layer on the surface of the sandy field. But this is but momentary, for the water sinks away immediately. Having thus lifted the upper layer, the water as it percolates carries down the finer particles and wedges them into the interstices between the next layer. Thus the sand becomes "set," and the filter locked. The more water that is pressed through now, the tighter are the particles packed together. In this the zoospores are arrested, are retained here, and become harmless by a useless germination among the sand grains, and not in contact with the tubers. More or less, this spore-retaining power exists in all soils, but it is best marked in sand, least marked in clay.

Arguing from the above facts Jensen has suggested the method of potato culture known as "high-moulding" (*vide* illustrations, *Gardeners' Chronicle*, Aug. 30, 1890, p. 249), which essentially consists in utilising the spore-retaining power of the soil. It consists in giving the plants a second moulding up just before the advent of the disease may be expected, or as late in the season as may be compatible with the growth of the tops. It is found that four inches of earth form an effectual barrier against the descent of the spore, and although it may not be possible always to obtain this amount of earth cover, yet the second moulding increases the protective action of the soil in two ways. First, it fills up the cracks and fissures caused by the growth of the tubers, and the openings in the soil through which the stems emerge, and which have been worked to a funnel shape by the movement of the plants by the wind. In the second place it actually increases the amount of earth that covers the tubers, and when properly done, makes the summit of the moulding acute, whereby the subsequent rain runs down between the ridges, in place of soaking through the flattened top of the ridge. The spores are thus, many of them, carried into the hollows between the ridges, where they germinate harmlessly at a distance from the tubers."

CORRESPONDENCE.

Kraal and Stable Manure.

Can you inform me as to the difference in value between ordinary kraal manure (sheep and goat) and stable manure, in relation to their use on ordinary farm lands?

H. H. W. LINDSAY.

Droogefontein, P.O. Dwaal, 2nd April, 1901.

In reply to Mr. Lindsay's enquiry relative to the "difference in value between ordinary kraal manure (sheep and goat) and stable manure, in relation to their use on ordinary farm lands," I would remark first of all that both sheep and stable manure vary considerably in composition. This variation depends on many circumstances, not the least important factor amongst which is climate; another is the mode of feeding adopted. Hence it stands to reason that the composition of such manure at the Cape may be expected to differ greatly from the results of European analyses. I am not aware that any number of analyses of stable manure have been made in this Colony and hence cannot say how this differs from the published analytical results; we have, however, performed a few analytical investigations with respect to kraal manures, and the results of these are to be found in the *Agricultural Journals* of October 12th and 26th, 1899. In the results there given some wide variations will be observed. Under all circumstances the best course would be to perform a few analyses of the actual manures that Mr. Lindsay proposes using, for the purpose of comparing with each other. Meantime it may be said that sheep manure as a rule contains less moisture than cattle manure, and is richer in nitrogen and phosphates. Dry horse manure, on the other hand, contains more potash, and here the further question enters, which of these constituents the soil lacks. These circumstances should be taken into account before a satisfactory and definite answer can be given to Mr. Lindsay's enquiry.

CHAS. F. JURITZ, Senior Analyst.

April 9th.

In-Breeding with Bull.

To what extent can a bull breed with his own progeny? Would the offspring o same deteriorate? if so, in what respects?

HERBERT H. W. LINDSAY.

Droogefontein, 12th April.

Mr. Lindsay's questions would require a special article to answer them fully, and even then there would be many points left unexplained. The consequences of close interbreeding, when carried on for a long time, are loss of size, constitutional vigour and fertility, sometimes accompanied by a tendency to malformation. A very good illustration of the evil effects of close interbreeding was given some years ago by Dr. J. Ritzema Bos in his report to the Biological Section of the fourth Dutch Nature and Health Congress. Dr. Ritzema Bos kept a large colony of rats (*Mus decumanus*) from 1887 to 1892, during that time he observed about thirty generations. He allowed only the nearest relations from the same litter to pair. The results were a rapid reduction in propagation, (1) because the number of pairings without results steadily increased, (2) the number of young at each birth decreased, and (3) the young became weaker and the mothers could not nurse them, so that the mortality among them was very great. He found that the mating of brother and sister gave much worse results than that of mother and son, or father and daughter.

But no one would attempt to carry out "in-and-in breeding" in the manner in which Dr. Ritzema Bos bred his rats; *i.e.*, by pairing closely related animals irrespective of their individual character or quality. In the formation of a distinct breed, by

combining the useful characters of two or more distinct breeds, close interbreeding, with judicious selection, becomes necessary, in order to evolve the particular type aimed at, and concentrate its hereditary power. The breeder would select the best males, and mate them with the best females, irrespective of their relationships. This is on the lines of "Natural Selection, or the Survival of the Fittest." All wild animals are closely inbred, but it is the most vigorous sires that become the fathers of the herds or flocks, consanguinity counts for nothing. In the struggle with their environment and with one another, the weak go to the wall, and only the fittest and strongest survive. It will be remarked, however, that all wild animals breed true to type and character, even to colour markings in many instances. This is the advantage aimed at in close interbreeding, and its attainment will compensate for a slight loss of constitutional vigour in many instances, more especially in breeding animals for beef, milk, wool, or hair, because the development of these special qualities to a high degree of excellence is not to the advantage of the animal itself, but the reverse. Hence for the attainment of a special purpose or quality, it may be highly advantageous to mate the most closely related animals, so long as they are healthy and vigorous. The chief consideration is to know when to stop, and that is where the art of the breeder comes in.

With respect to the grading up of a common herd by the use of pure-bred sires only, such as has been done in this country with the large majority of our herds of cattle, and flocks of merino sheep and Angora goats, if the farmer is able to secure a first-class sire to commence with, he may with advantage continue to use that sire to serve his own progeny to the third or fourth generation should he be unable to secure an equally good animal to take his place.

Many flocks of sheep have been founded by one sire, and the succeeding sires selected from the flock, and this practice has been continued for forty or fifty years, not merely without any manifest evil results following, but to the great improvement of the flock in uniformity of character and quality of fleece.

But while all this is perfectly true, it is equally true that an occasional cross between individuals of the same breed or particular variety of that breed, but belonging to distinct families, tends to confer increased constitutional vigour, the art consisting in selecting the animal to make the blend. Further, it is a well recognised fact that a change of soil and climate effects perhaps as great a change in the constitution as would result from the infusion of new blood; hence many breeders prefer to obtain fresh blood from the same strain as their own, but which has been bred and reared under a different environment.

It is quite possible that in my attempt to answer Mr. Lindsay's questions I may have raised more doubts than I have settled, but as a concluding piece of personal advice, I would say to him not to be in a hurry to part with a good bull until he is able to obtain a better one to take his place, unless the herd is already pure and closely inbred, when he should be able to select another one equally good out of the herd itself.

D. Hutcheon, Col. Vet. Surgeon.

Potato Blight and "Vrotpootjes."

Will you kindly inform me whether there is any risk of infection in planting onions on ground from which potatoes affected by "vrotpootje" have been lifted? I may mention that "vrotpootje" is a disease that starts at the "eyes" of the potato, and an infected tuber can at once be detected by the earth clinging to the eyes.

Novice.

Correspondent will find references to the subject of his letter in another part of this number. Onions will not be affected by "vrotpootje" in ground from which diseased potatoes have been lifted.—Editor.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 8th March 1901 :—

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known, that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle } ....
....
....

Owner's name and address } ....
....

In charge of..

Place to which Cattle are being sent..............................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..

(Address)..

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent......................

(Inspector's signature)..

(Address)..

Date....................

Farm Apprentices, Labourers, etc.

n connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices to date, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896, 30th September, 1897, 27th October, 1898, 13th April and 6th July, 1899.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent.	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town.)				
De Waal & Co., Cape Town.	Jadoo Fibre	0	10	6	per bale of 112 lb.
	Jadoo Liquid	0	2	6	per gallon.
Jas. Flower & Sons, Cape Town.	Economical Bone Fertilizer	8	10	0	per ton of 2,000 lb.
	Bone Meal	8	10	0	,, ,,
	(Prices free on trucks, Cape Town.)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphate	5	5	0	,, ,,
(Containing 26 per cent. Tribasic Phosphate of Lime.)					
	No. 2 Superphosphate	5	15	0	,, ,,
(Containing 30 per cent. Tribasic Phosphate of Lime.)					
	No. 3 Superphosphate	6	7	6	,, ,,
(Containing 37 per cent. Tribasic Phosphate of Lime.)					
	Vine Fertilizer	10	0	0	,, ,,
	(Prices free on trucks, Cape Town.)				
White, Ryan & Co., Cape Town.	Potato Manure	8	10	0	,, ,,
	Grain or Cereal Manure	7	0	0	,, ,,
	Tree and Vine Manure	6	10	0	,, ,,
	Pure Bone Meal	6	10	0	,, ,,
(Prices free on trucks at Woodstock Station.)					
Odam's Manure & Chemical Co., Port Elizabeth.	Odam's "Complete" Fertilizer	9	0	0	per ton.
	Odam's Vine Fertilizer	8	0	0	,, ,,
	Odam's Vitriolized Bones	8	0	0	,, ,,
White, Ryan & Co., Cape Town.	Odam's Cereal Fertilizer	8	10	0	,, ,,
(Prices free on trucks at Cape Town or Port Elizabeth.)					
Woodhead, Plant & Co., Cape Town	Thomas' Phosphate Powder (Basic Slag)	£4	5	0	per ton of 2,000 lb.
	Kainit	5	5	0	,, ,,
	Sulphate of Potash	16	0	0	,, ,,
	Muriate of Potash	16	0	0	,, ,,
	Superphosphates	5	5	0	,, ,,
	Nitrate of Soda	14	10	0	,, ,,
	Sulphate of Ammonia	1	2	6	per 100 lb.
	Vineyard Manure	1	15	0	per 112 lb.
	Tobacco Manure	1	15	0	per 200 lb.
Government Guano:—					
	Ordinary Guano	6	10	0	per ton of 2,000 lb.
	or	0	13	0	per bag of 200 lb.
	Rock Guano	6	17	0	per ton of 2,000 lb.
	or	0	13	9	per bag of 200 lb.

For use within the limits of the Colony.
Price includes delivery at Cape Town Railway Station.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		4 10 0	to	5 5 0
LINSEED CAKES.				
London made	ex mill	7 17 6	,,	8 0 0
American, in bags	ex dock	6 15 0	,,	7 0 0
Russian, in bags	,,	7 10 0	,,	7 15 0
Calcutta cakes		7 10 0	,,	7 15 0
COTTONSEED CAKES.				
London made	ex mill	4 12 6	,,	4 15 0
Egyptian, in bags	ex dock	4 10 0	,,	4 11 3
Decorticated	,,	6 0 0	,,	6 10 0
Meal	,,	5 15 0	,,	6 0 0
RAPE CAKES.				
East Indian Seed	ex mill	—	,,	—
MAIZE.				
Germ meal (American)		4 12 6	,,	4 15 0
,, ,, (English)	ex mill	4 17 6	,,	5 0 0
RICE MEAL.				
Rangoon	ex dock	4 2 6	,,	4 5 0
Locust beans, per ton		5 12 0	,,	—
MANURES, per ton 2,240 lb.				
Nitrate of soda		8 7 6	,,	8 10 0
Bone meal		4 0 0	,,	4 10 0
Kainit		2 7 6	,,	2 10 0
Basic slag, 45 per cent. phosphate of lime		1 17 6		—
Superphosphate, 25 per cent. soluble		2 7 0		—
,, guaranteed 35 per cent. soluble		3 3 0		—

Mark Lane Express, March 25th, 1901.

AMERICAN PRICES per ton of 2,000 lb.

	£ s. d.
Bran, per ton	4 7 6
Linseed cake, per ton	5 14 7
Cottonseed cake meal, per ton	5 4 2
Mealies, per bushel 60 lb.	0 1 11
Barley, per bushel 50 lb.	0 2 0
Clover seed, per lb.	0 0 6
MANURES—	
Ground Bones	4 11 8
Kainit	1 18 9
Florida Rock Phosphate	2 0 0
Nitrate of soda, per 100 lb.	0 7 9
Sulphate of Ammonia, per 100 lb.	0 11 7
Muriate of Potash, per 100 lb.	0 8 0

New York Weekly Journal of Commerce, March 18th, 1901.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

The second of the series for the year 1901 began on March 12th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

Mark.	Description & Ship.	Bales.	s.	d.
CAPE.		March 12		
	Briton, &c.			
DM	Grs.sup.com ...	24	notsold	
DM	,, ,, ,, dam	1	0	6½
DM	,, lks	2	notsold	
V KR	,, sup.com ...	34	notsold	
V KR	,, ,, ...	10	0	7¼
V KR	,, lks.	4	0	4¼
V KR	Flc.wsh.lam ..	6	0	8½
Sidney Jackson	Grs.1st com ..	19	notsold	
Sidney Jackson	,, 2nd ,, ..	13	0	5½
Sidney Jackson	,, clo	5	notsold	
Sidney Jackson	,, lam	5	0	6
Sidney Jackson	,, bel.pcs ...	12	0	4½
CJR/Caledon	..Grs.sup.	1	notsold	
<OI>	..Scd.blk	17	notsold	
EAST LONDON.				
	Gaul, Norham.			
TG/P	..Grs.sup	15	0	4½
R/U	.. ,, ,, ...	10	0	4½
TG/AK	.. ,, ,, ...	17	0	4¼
	Norman.			
Crossed swords EL	sup. sn.-wt ..	26	1	1
Crossed swords EL	,, ,, ..	20	1	0½
Crossed swords EL	,, ,, ..	20	1	0
Crossed swords EL	,, ,, ..	27	notsold	
Crossed swords EL	,, ,, ..	5	0	11
* * * Kaffrarian	Grs.sup.	2	0	5¼
* * * Kaffrarian	,, lam.	1	0	5¼
	Saxon.			
EL 6 stars in heart	Flc.wsh.sup. ..	26	0	6½
EL 6 stars in heart	,, ,, ,, ..	51	0	6¼
EL 6 stars in heart	Grs.sup	1	0	4
do. do. TM	..Flc.wsh.sup. ..	19	notsold	
MLL	..Grs.sup	6	0	5
	Carisbrook.			
M F G	Grs.sup.ext ..	26	0	5¾
M F G	,, ,, ,, ..	14	0	5
M F G	,, ,, ,, ..	12	0	5¼
M F G	,, ,, ,, ..	11	0	5
M F G	,, ,, ,, ..	8	0	4¾
<M>	,, ,, ...	3	0	5¾
<M>	Scd	1	0	8½

Guelph, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
M / F G	Grs.sup.light com.	24	0	7
	,, ,, ,, ,,	33 notsold		
	,, pcs	2	0	4½
	,, ,, ...	4	0	3
	,, sup.com ..	17	0	6¼
	,, ,, ,, ..	1	0	5¼

CAPE.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
O	sup.sn.-wt.ext ...	10	1	4½
	,, ,, ,, ..	2	1	3
	,, ,, ,, ..	2	1	2
ROP	Grs.ext.sup.com..	5	0	6¼
	,, ,, ,, ,, ..	30 not sold		

EAST LONDON.

Saxon Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
XSL	Grs.sup	14	0	7
	,, ,, ...	6	0	6¼
	,, ,, ...	10 notsold		
KFN	.. ,, ,, ...	10 notsold		
M in reversed triangle.	Grs.sup.	36	0	5¼

Tintagel, Dunvegan, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
XEL	Grs.sup.com. ..	35	0	5½
	,, ,, ,, ..	20	0	5
M / F G	,, ,, ,, hgt...	4	0	7¾
	,, ,, ,, ..	23	0	7½
	,, bro. ..	2	0	6
	,, pcs. ..	2	0	4
	,, bcl. ..	2	0	4¾
Crossed Arrows	Flc.wsh.sup. ..	13	0	6½
	,, ,, ,, ..	17	0	6¼
	Scd.sup.	50	1	1
	,, ,, ...	7	1	0
Baza	,, ,, ...	8	1	1
	,, ,, ...	25	1	0
	,, ,, ...	24	0	11½
Lunda	.. ,, ,, ...	11	1	0
L&P	,, ,, ...	3	1	0
	,, ,, ...	1	0	10½
XSQ	Grs. ext. sup. com.	27	0	6½
	,, ,, ,, ,,	27	0	6¼
	,, ,, ,, ,,	34 notsold		
	,, ,, ,, ,,	9	0	5½
CON	,, ,, ,, ,,	21	0	5¾
	,, ,, ,, ,,	98 notsold		
	,, ,, ,, ,,	2	0	5¼
	,, ,, ,, ,,	2	0	4½
	,, ,, ,, ,,dam	1	0	5

CAPE.

Gaul.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/JHT/L..	Scd.ext.sup. S W	10	1	4½
,, ,, S..	,, ...	1	1	0
,, WP&Co W..	,, ...	4	1	2½
,, ,, S..	,, ...	1	1	0

Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl OR&M/G	Scd.ext.sup. S W	19	1	3
S/OR&MG/G...	,, ...	2	1	2

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl WP&Co/W	Scd.	5	1	2½
do. do. S	.. ,, ...	1	1	0½
do. do. W	.. ,, ...	3	1	2

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
R&Co	..Grs.	50	0	4¼

CAPE. March 13

Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
Anchor	Grs.sup.com. ..	57	0	6½
	,, ,, ,, ..	61	0	6¼
	,, ,, ,, ..	49	0	6½
	,, ,, ,, ..	48	0	6¼
	,, ,, ,, ..	47	0	6¾
	,, ,, ,, ..	37	0	6¼
	,, lks.	13	0	2¾
	,, mix.blk. ..	1	0	6¼
	,, de'd	1	0	4¼
	,, lam.	3	0	6
	,, ,, ...	1	0	5
HES Anchor.	Grs.sup.com ..	25	0	6
	,, lks. ..	1	0	2½
	,, lam.mix. ..	1	0	5¼

Dunottar, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
RB U	Grs.sup.com. ...	13	0	6¾
	,, ,, ...	2	0	6
	,, britch ..	1	0	3¼
Anchor PV&Co	,, sup.com. ...	8	0	6
	,, ,, ...	3	0	3½
	,, ,, ...	6	0	6½
	,, lam.	4	0	6
	,, ,, ...	6	0	5¼
	,, ,, ...	2	0	2½
	,, de'd	1	0	4
	,, C C ..	2	0	3¼

Norman, Dunottar. at Mossel.

Mark.	Description & Ship.	Bales.	s.	d.
MB&Co	Grs.sup.com. ...	13	0	6¼
	,, ,, lam. ...	13	0	6½
	,, ,, ,, ..	12	0	6
	,, ,, ,, ..	4	0	5½
	,, lks.	2	0	2½

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
FSS	...Scd.sup. ...	32 notsold		

Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
OB	Grs.sup.com. ...	14	0	5¼
	,, ,, ,, ...	29	0	5
	,, ,, ,, ...	13	0	5

EAST LONDON.

Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
BON	Grs.sup.lam. ...	5	0	5¾
	,, ,, ...	4	0	5¼
	,, ,, ...	12	0	5¾
	,, ,, ...	22	0	5½
	,, ,, ...	16 notsold		
S	,, ,, ...	12	0	6
KRD	.. ,, ,, ...	12	0	5½

Scot, Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs.sup.	13 notsold		
	,, ,, ...	14	0	5¼
IVY	,, ,, ...	24	0	5¾
	,, ,, ...	12	0	5½
SLC	,, sup.com. ...	12	0	6¼
	,, ,, ,, ..	8	0	5¾
XL	.. ,, ,, ,, ..	9 notsold		
IXL	.. ,, ,, ,, lam.	19 notsold		
Anchor	..Flc.wsh.sup. ..	22 notsold		
KSK	..sn.-wt.sup ...	17	1	1
MER	..Grs.sup.	6 notsold		
LBG	.. ,, ,, com ...	11 notsold		

CAPE. March 14

Gaul.

Mark.	Description & Ship.	Bales.	s.	d.
SAS	Grs.com.	23	0	5¼
	,, C C ...	1	0	3¼

EAST LONDON.

Braemar, Tantallon, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	20	1	0½
	,, ,, ...	13	1	0
	,, ,, ...	1	0	11
	,, ,, ...	11	1	0½
	,, ,, ...	61	0	11½
Yukon	.. ,, ,, ...	9	0	11½
Bomvana	.. ,, ,, ...	7	0	11
SW	Grs.sup.	18	0	4¾
	,, ,, ...	31	0	4¼

Mark.	Description & Ship.	Bales.	s.	d.
AMcE	Grs.sup.com. ..	46	0	5½
Glen Ewan	,, ,, ,, ..	19	0	5¼
J. H. King	,, ,, ,, ...	36	0	6¾
Highland	,, ,, ,, ...	15	0	6½
Home	,, ,, ...	1	0	5¼
Yukon	Scd.sup.	10	0	11
	,, ,, ...	11	0	10½
	,, ,, ...	5	0	10
M/L&P	.. ,, ,, ...	6	0	10½

Norman, Kinfauns, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
OX/MB/U	..Grs.com.... ..	19	0	5¼
MB/SM	,, sup.	54 notsold		
	,, ,, dam ..	2	0	4
L/MB/U	.. ,, com	10	0	5¼
S ,, ,,	... ,, ,, ...	7	0	5
MB/U	.. ,, ,, ...	2	0	5¼
Bolo	Scd.sup	19	1	0
	,, ,, ...	18	0	10½
	,, ,, ...	23	0	11½
Yukon	,, ,, ...	9	0	11
	,, ,, ...	3	0	9

Dunottar, Moor,

Mark.	Description & Ship.	Bales.	s.	d.
VB/S	...Scd.sup.	17	1	1
,, T	.. ,, ,, ...	9	1	1
,, K	.. ,, ,, ...	26	1	0
,, MP	.. ,, ,, ...	25	1	0½
,, T	... ,, blk	2	0	10½
Baza	,, sup.	65	1	0
	,, ,, ...	10	0	11½
Lunda	... ,, ,, ...	10	0	11½
L&P	,, ,, ...	2	1	0
	,, ,, ...	4	0	10½
(+)	.. ,, ,, ...	6	1	0

Braemar, Norham, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	..Flc.wsh.sup. ..	60	0	6½
PB/RA	Grs.com	7	0	5
	,, ,, ...	12	0	4¾
,, TLT	... ,, sup	4	0	5¼
HHM	,, ,, ...	3 notsold		
	,, ...	1	0	4
PB/EH	... ,, sup	8	0	5¼
,, ,, Long	.. ,, ,, ...	1	0	5¼
,, JW	... ,, ,, ...	6	0	5¼
,, WSH	... ,, ,, ...	10	0	5
,, ,, LL	.. ,, com	4	0	5½
,, ,, SL	... ,, sup.	4	0	4¾
,, HHM	.. ,, com... ..	11	0	5¼

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
LUL	Grs.sup.com. ...	52	0	5½
	,, ,, ,, ..	48	0	5¼

CAPE. March 15.

Moor, Scot, Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
FRS. (New Clip)	Grs.sup.com. ...	8	0	6¾
	,, ,, ...	31	0	6½

?

Mark.	Description & Ship.	Bales.	s.	d.
EXW	..Scd.blk. ..	.. 15	notsold	
MB&Co	.. Grs.sup. .	.. 13	0	7
H & Co	,, ...	.. 6	0	6¼
F in triangle	,, line +	.. 1	0	4
London	,, mix. ..	.. 3	0	3¼

ALGOA BAY.

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
JP H	sn.-wt.sup.	.. 62	1	1
	,, ..	... 9	0	11½
	,, ...	.. 2	0	8½
	Scd.grey ...	.. 3	0	7½

EAST LONDON.

Tantallon, Scot, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed swords	sn.-wt.sup.	.. 62	1	1
	,, ,,	.. 24	1	0½

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
EL 6 birds in reversed triangle	Flc.wsh.sup.	..101	notsold	
	,, ,, ,, dam.	1	0	5½
GOT	...Grs.sup. ..	.. 16	notsold	

Dunvegan, Gaika, Dunottar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed swords	sn.-wt.sup.	.. 17	1	0½
W. J. Warren	Grs.sup.com.skt.wth	8	0	6¾
	,, ,, ,, ,, hgt	21	0	7¼
	,, skt lks.dam.	1	0	3
	,, ,, ,, ..	1	0	3
S.M. Price/H..	,, ext.sup.com.skt	15	0	6¾
,, E	...,, ,, ,, ,, ,,	7	notsold	
,, BW	...,, ,, ,, bro ..	3	0	4¾
,,	..,, ,, ,, lks. ..	2	notsold	
BLR	Flc.wsh.sup	... 24	0	6¾
	,, ,, ,,	... 23	0	6½
	,, ,, ,,	... 22	0	6¼
S(KN)W	sn.-wt.sup.	... 16	notsold	
	,, ,,	... 5	1	0½
	,, ,,	.. 37	notsold	

Guelph, Goorkha, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
E (B) L	Grs sup. ...	... 8	0	6½
	,, ,, ...	... 21	0	6¼
	,, ,, ...	... 18	0	6
	,, ,, ..	.. 6	0	5¾
	,, mix. ..	... 1	0	3½
XSL	,, sup.com	... 12	0	7¼
	,, ,, ,,	.. 14	0	6½
	,, ,, ,,	.. 21	0	5½

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs. ..	.. 8	notsold	
	,, ...	... 15	0	5¾
BOR	,, sup com.	.. 13	0	6¾
	,, ,, ,,	.. 22	0	6¼
	,, ,, ,,	.. 17	0	6
WAR	,, ,, ...	.. 16	0	6¼
	,, ,, ...	.. 10	0	6
	,, ,, ..	.. 12	notsold	
	,, ,, ...	.. 10	0	5½

Norman, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
DEW	Grs.com. ..	... 3	0	7
	,, sup. ...	.. 21	0	6¾
MJL	.. ,, com....	. 11	0	5¾
TP	... ,, ,, ..	... 30	0	5½
RB&Co	,, ,, sup.	.. 59	0	5
	,, sup.	... 5	0	4¾
	,, ,, ..	.. 17	0	4½
	,, ,, ...	.. 12	0	4¼
<OI>	..Scd.blk. ..	... 16	notsold	

Carisbrook, Norman, Tantallon, Scot, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Zulu	sn.-wt.sup.	... 19	1	0½
	,, ,,	.. 14	1	0
	,, ,,	.. 23	notsold	
	,, ,,	... 17	0	11½
	,, ,,	... 47	notsol	
	,, ,,	... 3	0	10½
B (in diamond)	,, ,,	... 6	notsold	
	,, ,,	7	0	11
	,, ,,	... 11	0	11½
FBT HebeHebe	Flc wsh.sup.	.. 19	0	6½
	,, ,, ,,	.. 20	0	6¼
	,, ,, mix.	.. 1	0	4¼
B/L&P	..sn.-wt. ..	.. 13	notsold	
C. F. Mills Bousieside	Grs.ext.sup.	.. 12	0	6½
	,, ,, ,,	.. 6	0	6¼
IS/Toise	sn.-wt. ..	.. 5	1	0½
	,, ...	.. 1	0	10
TM ,,	,, ...	... 3	0	11
	,, ..	... 1	0	10
B in triangle..	,, sup.	.. 24	notsold	
K (in triangle)	,, ...	... 19	1	0
	,, ..	... 9	0	11½
	,, ..	.. 4	0	11
	,, ..	.. 29	1	0
T in triangle..	,, sup.	.. 40	notsold	

CAPE. March 16.

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
SRR Caledon	Grs.sup.com.	.. 42	0	6½
	,, ,, ,,	.. 22	notsold	

ALGOA BAY.

Scot, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
AJB	Grs.sup.com.	20	0	5¼
	,, ,, ,,	20	0	5
	,, ,, ,,	36	0	4¾
	,, ,, ,,	10	0	4¼
Crown	,, ,, ,,	24	notsold	
WP	,, ,, ,,	31	0	6½
	,, ,, ,,	27	notsold	

Briton, Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
WS	Sup.sn.-wt.ext.	8	notsold	
	,, ,,	1	0	10½
CCC	,, ,,	2	notsold	
WIP	Grs.sup.com.	6	0	6½
	,, ,,	20	notsold	
SAL	,, ,,	5	0	5
	,, ,,	14	0	4½

EAST LONDON.

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
F M G	Grs.ext.sup.com.	16	0	7¾
	,, ,, ,, ,,	23	0	7½
	,, ,, ,, ,,	14	0	7¼
	,, ,, ,, ,,	5	0	6¼
	,, ,, ,, ,,	5	0	6¾
	,, sup.pcs.	10	0	4¼

Carisbrook, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows.	Scd.sup.	9	1	1
	,, ,,	45	1	0½
	,, ,,	4	0	11½
,, FMT	,, ,,	20	1	0½
Baza	,, ,,	31	0	11½
	,, ,,	17	notsold	
	,, ,,	8	0	11
Lunda	,, ,,	7	0	11½
	,, ,,	38	0	11
L&P	,, ,,	2	notsold	

Dunottar, Scot, Kinfauns, Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
PB AS	Grs.sup.com.	18	0	6¾
	,, ,, ,,	11	0	6½
	,, ,,	1	0	5¼
,, JV	,, ,,	14	0	5
(PB) JG	,, ,,	2	0	5½
	,, ,,	2	0	4¾
SLC	Grs.sup.com.	8	0	6½
	,, ,, ,,	23	0	5¾
	,, ,, ,,	10	notsold	
	,, ,, ,,	20	0	5¾
MER	,, ,,	5	0	5¾
	,, ,,	8	0	5½
	,, ,,	4	notsold	
I<V>Y	,, ,,	14	0	5½
	,, ,,	24	notsold	

Tantallon, Gaika, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
XCL	Grs.sup.com.	10	0	6½
	,, ,, ,,	23	0	6¼
	,, ,, ,,	23	0	5¾
	,, ,, ,,	4	0	5½
XEL	,, ,, light	10	notsold	
Glencairn	Grs.sup.	5	0	6
	,, ,,	14	notsold	
	,, ,,	3	0	5¾

Briton, Gaul, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
GEM	Grs.sup.com.	14	0	6
MMS	,, ,,	13	0	5½
	,, ,,	2	0	4½
DGF	sup. F W	47	0	6
XSL	Grs.sup.light	8	0	6
VXL	,, ,, ,,	16	0	6½
	,, ,,	7	notsold	

Garth, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
[W]	Grs.sup.com.	22	0	5¼
	,, ,, ,,	53	notsold	
	,, ,, ,,	1	0	4¾
(A)	sup.sn.-wt.	41	notsold	
(B)	,, ,,	138	notsold	
(C)	,, ,,	4	1	0½
	,, ,,	26	1	0

CAPE. March 18.

Briton, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
F M in reversed triangle G	Grs.ext.sup.com.	14	0	7
	,, ,, ,, ,,	7	0	6¼
	,, ,, ,, ...	4	0	6
F, C in do.	,, ,, ,, com.	46	0	6½
do. G	,, ,, ,, ,,	23	0	6½
JS	,, com. ...	10	0	5¼
MJ	,, ,, ...	9	0	5¼
	,, ,, dam.	1	0	4½
PD	,, ,, ..	17	0	5

ALGOA BAY.

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
AJB	Grs.sup.com.	6	0	5¼
	,, ,, ..	13	0	5¼
	,, ,, ...	40	0	4¾
	,, ,, ..	11	0	4¼
GC	,, ,, ..	1	0	5¼

EAST LONDON.

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
F M G	Grs.sup.com.	8	0	6¾
	,, ext.sup.	13	0	6¼
	,, ,, ,,	8	0	6

CAPE. March 19

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
L&B S	Grs.	59	0	6½
	"	30	0	6¼
	" dam	3	0	6
	" lam	16	0	6
	" blk.mix.	2	0	4
	" lks.	3	0	3
	wsh.	3	0	8½
B	Grs.mix.	1	0	3

CAPE. March 20

Kinfauns

Mark.	Description & Ship.	Bales.	s.	d.
YKS	Grs.sup.	9	0	5¼

CAPE. March 21

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
LFW	Grs.sup.	25	0	5¾
23 in Triangle CBW	sn.wt.sup.	8	1	1½
24 in Triangle	" "	16	notsold	
LSB	" "	16	1	1

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
LUL	Grs.sup.com.	58	0	5¼
	" " "	31	0	5

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
AB/J	Grs.sup.	57	0	4½

EAST LONDON.

Tantallon, Saxon, Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
Baza	Scd.sup.	45	1	0
Lunda	" "	13	0	11½
	" "	3	0	10
L & P	" "	1	0	11½
	" "	2	0	11
(PB) GWI	Grs.com. E	7	0	5¾
	" " lam	3	0	6
	" mix	1	0	5
TLT	" com.	35	0	5½
	" sup.	1	0	4¾
PB "	" "	6	0	5¼
< >	Flc.wsh.sup.	33	0	7¼

Dunottar,

Mark.	Description & Ship.	Bales.	s.	d.
GJ	Grs.sup.com.	28	0	6¾
" &c	" " "	8	0	6¾
XL	" " "	17	0	7¼
	" " "	17	0	7
	" " "	11	0	6¾
	" " "	6	0	6½
XSL	" " "	18	0	6¼
SLC	" " "	27	0	6
	" " "	20	notsold	
ROS	" " "	10	0	5½

Tintagel, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
KAF	Grs.sup.	54	notsold	
	" "	49	0	5½
	" " dam	1	0	4¾
	" " xbd	3	0	5½
S	" "	33	notsold	
	" "	1	0	5¼
TTT	" "	11	0	5½
	" "	16	notsold	
	" "	4	0	5
KRD	" "	18	0	5¾
	" "	8	0	5¼
SW	" " com.	54	notsold	

Norman, Briton, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	13	1	0
	" "	29	0	11½
Yukon	" "	8	0	11½
	" "	14	1	0
	" "	15	1	0
M/L&P	" "	2	0	11
MB	Grs.blk.mix.	1	0	4½
Bomvana	Scd.sup.	4	0	11

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
MB Q	Grs.com.	37	0	5¼
	" "	47	0	4¾
	" sup.	14	0	4½
	"	6	0	4
	" "	9	0	4¾
	" "	12	0	5¼
	" "	36	0	4¾
	" "	2	0	4½
MB	" sup.com.	15	0	4½
	" "	15	0	4½
CH	" " com.	19	0	5¼
GM	" " "	13	0	5¼
HV	" " "	8	0	4¾
Bolo	Scd "	13	1	0½
Yukon	" "	3	0	11

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	27	1	0½
	" "	27	1	0
	" "	12	0	11½
Yukon	" "	18	0	11½
	" "	11	0	10½
Bomvana	" "	6	0	10½

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup. ...	24	1	0
	,, ,, ...	24	0	11½
	,, ,, ...	2	0	9½

Norham.

Mark.	Description & Ship.	Bales.	s.	d.
M L&P	Scd.sup. ...	8	0	11
	,, ,, ...	6	0	10½
	,, ,, blk. ...	3	0	10½

CAPE

Carisbrook, Scot, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
WaverleyMills	sn.wt.ext.sup.	20	1	5
WM	,, ,, ,, ...	15	1	4½
ESSW	,, ,, ,, ...	1	notsold	
NOP	Grs.ext.sup.com.	9	notsold	
	,, ,, ,, ,,	14	0	6
	,, ,, ,, ,,	6	0	5½
ROP	,, ,, ,, ,,	30	0	6½
S	,, ,, ,, ,,	1	0	5½

ALGOA BAY.

Tantallon, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
<H>	Scd.fine blk ...	9	notsold	
AJB	Grs.sup.com. ...	22	0	5
	,, ,, ,, ...	27	0	4¾
	,, ,, ,, ...	21	notsold	
	,, ,, ,, ...	17	0	4¼
	,, ,, ...	1	0	4

EAST LONDON.

Briton, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
GR (in triangle)	Grs.sup. ..	16	0	6
	,, ,, ...	4	0	5¾
	,, ,, lam ..	4	0	5¾
SEY in triangle	,, ,, ...	10	0	5¾
	,, ,, longcom.	20	0	6¼
	,, ,, ,, ,, ..	15	0	5¾

Dunottar, Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
S	Grs.sup.lam. ..	4	0	6¼
	,, ,, ..	10	0	6½
	,, ,, ..	8	0	5¾
	,, ,, ..	7	0	5½
WAR	Grs.sup.lam. ..	13	0	6¾
	,, ,, ,, ..	5	0	6¼
	,, ,, ...	20	0	6¼
	,, ,, ...	24	0	6½
	,, ,, ...	5	0	5½

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
XL	Grs.sup.com. ..	4	0	7
	,, ,, ,, ..	10	0	6½
	,, ,, lam. ..	6	0	6¼
	,, ,, com. ..	3	0	6
	,, skt.	1	0	3½

Braemar, Norham, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
XL	Grs.ext sup.com.	27	0	7½
XSL	,, sup.com. ..	25	0	7
WO/Ronan	,, ,, ,, ..	64	notsold	
KAF	,, ,, ..	37	notsold	

Moor, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
KRD	Grs sup. ..	5	0	5¼
SAY	,, ,, ...	6	0	5½
	,, ,, ...	12	0	5¼
	,, ,, ...	9	0	4¾
CON	Grs.ext.sup.com.	24	0	5¾
	,, ,, ,, ,, ..	24	0	5½

Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
XSQ	Grs.ext.sup.com.	34	notsold	
XCL	,, ,, ,, ,, ..	22	0	6
	,, ,, ,, ,, ..	13	0	5½
	,, ,, ,, ,, ..	2	0	5

CAPE. March 22.

Carisbrook, Saxon, Briton, Braemar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
RHD	Grs.sup com. ..	52	0	5½
	,, ,, ,, ..	21	0	5¼
	,, ,, ,, ..	17	0	5
	,, ,, ,, ..	5	0	4½
	,, ,, ..	9	0	4¼
	,, ,, ..	10	0	4½
RS	,, ,, ..	10	0	4½
	,, ,, ..	14	0	4¼
SUN	sn-wt.ext.sup. ..	42	1	1
	,, sup. ..	1	1	0½
AGO	Scd.sup.blk. ..	6	1	0
HH	,, C ..	14	0	6
	,, ,, ..	12	0	6
AR	Grs.sup.com. ..	33	0	5
AJB	,, ,, ..	19	0	4¼
	,, ,, ..	16	0	4½

EAST LONDON.

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
RT	Grs.sup.com.	28	0	6¼
	,, ,, ,,	17	0	6
W	,, ,, ,,	21	0	6¼
	,, skt ..	1	0	2¾
	,, ..	1	0	5½
CR	,, sup.com.	9	0	6¼
JJ	,, ,, ,,	10	0	5½
	,, ,, ,,	2	0	4½
VV	,, ,, ,,	11	0	4¾
LS	,, ,, ,,	5	0	5
BH	,, ,,	21	0	5¾
T	,, ,,	2	0	5
G	,, ,,	2	0	5

Avondale.

Mark.	Description & Ship.	Bales.	s.	d.
IXL	Grs.sup.com.	13	0	7
	,, ,,	1 notsold		
	,, ,, com.	11	0	6¼
Rowe	,, ,, ,,	18	0	5¾
	,, ,, ,,	13	0	5½
LB	,, ,, ,,	11	0	5¾

Norman, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
A.Sephton	Grs.sup.com.	32	0	6¾
	,, ,, ,,	44	0	6½
	,, ,, ,,	21	0	6¼
	,, ,, ,,	20	0	6
	,, ,, ,, dam	1	0	5½
	,, skt	1	0	3¾
KSK	sn.-wt.sup.	7	1	1
	,, ,,	4	1	0½
E(B)L	Grs.sup.	22	0	7½
I<V>Y	,, ,,	7	0	5¾
IVY	,, ,,	15	0	5¾
	,, ,,	16	0	5½
C. G. Hay	,, ,,	27 notsold		

Gaul, Kinfauns, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
KAF	Grs.sup.	8	0	4¾
BON	Partwsh	5	0	5¾
	Grs.sup.	9	0	5½
	,, ,,	16	0	5¼
W N S	sn.-wt.ext.sup.	14	1	3
	,, ,, ,,	8	1	2
	,, ,, ,,	1	1	0½
HWY	Grs.sup.	12	0	5
	,, ,,	26 notsold		

CAPE March 23.

Tintagel, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms. TW	sn.-wt.ext.sup	4	1	5
	,, ,, ,,	6	1	3
	,, ,, ,,	3	1	2½
	,,	1	1	0½
	,, sup	2 notsold		
	,,	1	1	2
	,,	4	1	1

Mark.	Description & Ship.	Bales.	s.	d.
Paarl TW&Co.	sn.-wt.sup	3	1	3
	,, ,,	12	1	2½
	,, ,,	4	1	1½
	,,	5	1	3
	,,	2	1	1
	,,	3	1	0
	,, ext.sup.	5	1	6
	,, ,, ,,	5	1	5½
	,, sup.	2	1	4
,, ,, I	sup.sn.-wt.ext.	3	1	5
	Scd. coarse	3	0	10½
	,, grey	2	0	9½
C/TW&Co.	,, coarse	5	0	11
	,, ,,	1	0	6½
CC ,,	,, grey	7	0	8½
	,, ,,	1	0	5
Waverley Ms W/TW	sn.-wt.ext.sup.	3	1	5
	Scd.grey	1	0	8½
,, TW/S	sn.-wt.ext.sup.	2	1	4½
	,, ,, ,,	16 notsold		
,, TW&Co	Scd.grey	1	0	7

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
TW DH	Grs.com.	24	0	6½
	,,	8 notsold		
	mix	2 notsold		

ALGOA BAY.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
MD	Grs.sup.com.	5	0	5¼
	,, ,, ,,	20	0	5
	,, ,,	24	0	4¾
	,, ,,	11	0	4¼

EAST LONDON.

Briton, Carisbrook, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
F M in reversed triangle G	Grs.sup.com.	19	0	7
	,, ,, ,,	14	0	6¾
RB S	Grs.sup.com.	33	0	5
	,, ,, ,,	33	0	4¾
	,, ,, ,,	6	0	4¼
	,, ,,	3	0	5
	,, ,, ,,	22	0	5
	,, ,, ,,	18	0	4¾
	,, ,,	6	0	4½
	,, com.	16	0	4¾
	,, sup.	24not sold		
	,, ,,	92	0	4¼
	,, lam.	12not sold		
	,, ,,	8	0	4½

Mark.	Description & Ship.	Bales.	s.	d.
COL	sn.-wt.sup.	3	1	3
	,, ,,	11	1	1½
	,, ,,	14	1	1
	,,	1	0	11½
	Scd.grey	3	0	7½
SW/Cathcart V	Grs.com.	10	0	6½
VA	,, ,,	3	0	5¼
	,, sup.	8	notsold	

Norman, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
CB	Grs.com.	15	0	5½
	,,	1	0	4¾
A in double triangle	,, sup.fine	14	0	6¼
	,, ,, ,,	9	0	6
B in double triangle	,, ,, ,,	20	0	6
Arrow through Heart	Flc.wsh.sup.	48	0	6¼
<JGD>	Grs.sup.	48	notsold	

Dunvegan, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
K	sn.-wt.sup.	24	1	1
	,, ,,	43	1	0½
	,, ,,	33	1	0
B in triangle	,, ,,	24	1	0
XSC	Grs.ext.sup.com.	26	notsold	
Various	... ...	11	notsold	

Tantallon, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
SBC	Grs.ext.sup.com.	24	0	6¾
	,, ,, ,, ,,	9	0	6
	,, ,, ,, ,,	2	0	5½
XBC	,, ,, ,, ,,	34	notsold	
M F G	Grs.sup.com.	16	0	6½
	,, ,, ,,	7	0	6¼
	,, ,, ext.	44	0	6½
	,, ,, ,,	11	0	6¼
	,, ,, ,,	26	0	5½

Dunvegan, Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
EL Six Birds in reversed triangle	Flc wsh.sup.	54	notsold	
	,, ,, ,,	38	0	6½
	,, ,, ,,	4	0	5¼
TM ,,	,, ,, ,,	17	0	6½
P.J.Froneman Stutterheim	Grs.sup.	7	0	6
	,, ,, lam	4	0	6

Saxon, Norman, Braemar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
LGL	Grs.sup.	81	notsold	
S	,, ,,	19	notsold	

Mark.	Description & Ship.	Bales.	s.	d.
CK	,, ,,	13	0	5½
KAF	,, ,,	21	0	5¼
WAR	,, ,,	15	0	6
	,, ,,	33	notsold	
LGL	Grs.sup.	39	notsold	
	,, ,,	50	0	5¼
	,, ,, dam.	2	0	5

CAPE. March 25.

Tantallon, Briton, &c.

Mark.	Description & Ship.	Bales.	s.	d.
SRR Caledon	Grs.ext.sup.com.	7	0	7
	,, ,, ,, ,,	9	notsold	
	,, ,, ,, ,,	9	0	6¾
	,, ,, ,, ,,	16	0	6½
NOP	,, ,, ,, ,,	7	0	6¼
	,, ,, ,, ,,	2	0	5½

ALGOA BAY.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
<BS>	Grs.sup.com.	17	not sold	

EAST LONDON.

Gaul, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
L in Triangle	Grs sup.	12	0	6
	,, ,, lam.	6	0	6
C	,, ,,	9	0	6¼
	,, ,,	13	0	6
	,, ,, lam.	4	0	6¼
W	,, ,,	13	0	5¾
	,, ,,	7	0	5¼
	,, ,, lam.	1	0	4¾
M	,, ,,	15	0	5½
	,, ,,	4	notsold	
	,, ,, lam.	3	0	5½
O in Triangle	,, ,,	12	0	5½
	,, ,, lam.	5	0	5½
F in Triangle	,, ,,	4	0	5½
	,, ,, lam.	2	0	5½
D in Triangle	,, ,,	3	0	5½
	,, ,, lam.	1	0	5¼
E in Triangle	,, ,,	3	not sold	
F in Triangle	,, ,,	4	0	6
	,, ,, lam.	1	0	5½
W in Triangle	,, ,,	8	0	6
	,, ,, lam.	1	0	5¼
C in Triangle	,, ,,	9	0	5¾
	,, ,, lam.	8	0	6
L in Triangle	,, ,,	8	0	5½
	,, ,, lam.	3	0	5½
M in Triangle	,, ,,	8	0	4¾
	,, ,, lam.	1	0	5
D in Triangle	,, ,, ,,	2	0	5¼
E in Triangle	,, ,, ,,	3	0	4¼
O in Triangle	,, ,,	1	0	5½
Glencairn	,, ,,	13	0	5¼
	,, ,, long	1	0	6¼

Tantallon, Saxon, Dunvegan, &c.

Mark.	Description & Ship.	Bales.	s.	d.
XLG	Grs.ext.sup.com.	8	0	5¾
	,, ,, ,, ,,	49	not sold	
XSL	.. ,, sup.light ...	10	0	6¼
KFN	.. ,, ,, ,, ..	10	not sold	
VXL	,, ,, ,, ..	1	not sold	
	,, ,, ,, ..	1	0	5¼
XSQ	.. ,, ext.sup.com.	34	not sold	
NOM	,, ,, ,, ,,	26	not sold	
	,, ,, ,, ,,	1	0	5¾
XEL	.. ,, sup.light. ...	10	not sold	

CAPE.

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
LUL	Grs.sup.com. ...	21	0	6¼
	,, ,, ,, ..	32	0	5½

EAST LONDON.

Briton, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup. ..	7	1	0
	,, ,, ..	12	0	11½
	,, ,, ...	18	0	11
	,, ,, ..	41	1	0½
	,, ,, ..	48	1	0
Yukon	,, ,, ..	14	1	0
	,, ,, ..	5	0	10½
	,, ,, ..	56	1	0
Bomvana	.. ,, ,, ..	15	0	11
MB/AN	Grs.com. ..	39	0	5
	,, ..	5	0	4¾
,, R	,, ,, ..	122	0	5
	,, ,, ..	34	0	4¾
	,, ,, ..	5	0	3¾
	,, sup. ..	3	0	4¼
,, Q	,, ,, com. ..	9	0	6¼
	,, ,, ,, ..	17	0	5½
	,, ,, ,, ..	16	0	5¼
	,, ,, ..	10	0	4½
	,, ,, ..	28	0	4¼
	,, ,, ..	14	0	4½
	,, ,, ..	7	0	4½

CAPE.

Kinfauns, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
JCK	Grs.sup.com. ..	14	0	5½
	,, ,, ,, ..	16	0	5
	,, ,, ,, ..	12	0	5¼
	,, ,, ,, dam.	2	0	5½
	,, ,, ..	21	0	4
	,, ,, mix ..	2	0	3¾
RS	Grs.sup.com. ..	22	0	5¼
	,, ,, ..	15	0	4½
SB/D	,, ,, com. ..	41	0	5¼
	,, ,, ,, ..	35	0	5
RS/Y in reversed triangle	,, ,, ..	24	0	4½

EAST LONDON. March 26.

Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
SXM	Grs.sup.com. ..	12	0	6¼
	,, ,, ,, ..	11	notsold	
IJ	,, ,, ,, ..	14	0	6¾
	,, lks. ..	2	0	3¾
W. H. James	,, sup.com. ..	8	notsold	
	,, ,, ,, ..	26	0	6½
	,, ,, ,, ..	1	0	5¾
XL	.. ,, ,, ,, ..	5	0	6¾
H	,, ,, ,, ..	13	notsold	
	,, ,, ,, ..	8	0	6¼

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
TGF/Kinahan	Grs.sup. ..	23	notsol	
KRD	,, ,, ..	32	notsold	
	,, ,, ..	11	0	5¼
Anchor	Flc.wsh.sup. ..	58	0	6¾
	,, ,, ,, ..	10	0	6¼
SAY	Grs.sup. ..	18	notsold.	
E(B)L	,, ,, ..	18	0	6½
Various	.. ..	22	notsold	

Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
LGL	Grs.sup.com. ..	18	0	5½
	,, ,, ,, ..	31	0	5¼
SXM	,, ,, ,, ..	15	notsold	
	,, ,, ,, ..	16	0	6¾
	,, ,, ,, ..	15	0	6½

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 20th April, 1901, as telegraphed by the Civil Commissioners of the places respectively named, and from Natal, is published hereunder.

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ...	...	...	...	...	..	...	...	...	...	...	...	...	...	..	...	...
Beaufort West .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burghersdorp ..	0 10 6	...	...	0 12 0	...	0 12 0	...	0 12 0	0 8 6	...	...	0 0 7	0 1 0	0 2 9	...	...
Cape Town ..	0 10 6	0 12 6	0 10 9	0 8 0	...	0 10 0	0 11 0	0 12 0	...	0 0 5¼	0 0 7	0 0 7½	...	...	17 0 0	1 4 0
Clanwilliam ..	0 12 0	0 15 0	0 14 0	0 8 0	0 11 0	0 9 0	0 12 0	0 9 6	1 5 0	0 1 3	0 0 7	0 0 6	0 1 6	0 1 3	11 0 0	0 18 0
Colesberg ...	0 12 6	...	...	0 9 0	...	...	...	0 11 6	0 17 6	...	0 0 6	0 0 7	0 1 4	0 2 9	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ..	0 12 6	0 18 0	0 17 6	0 13 6	0 9 6	0 15 6	0 18 0	0 12 6	1 5 6	0 1 6	0 1 0	0 1 0	0 2 9	0 3 6	24 10 0	1 4 0
Graaff-Reinet ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graham's Town ..	...	...	...	0 10 6	...	0 10 6	...	0 10 0	0 14 9	0 1	0 0 8½	0 0 9¼	0 1 6½	0 3 4½	...	...
Kimberley ...	0 13 0	0 16 6	0 13 6	0 13 0	0 13 0	0 1 0	0 17 0	0 12 0	0 18 0	0 1 6	0 1 0	0 0 10	0 2 0	0 3 0	£17 to £20	18/- to 22/-
King Wm's Town	0 13 6	0 5 0	...	0 10 0	0 11 0	0 16 0	0 14 6	0 15 0	0 16 6	0 1 6	0 0 9	0 0 10	0 1 6	0 3 0	£15 to £25	15/- to 26/-
Malmesbury ..	0 11 6	0 15 0	0 12 0	0 11 0	...	0 9 0	0 10 0	0 8 6	1 0 0	0 1 3	0 0 7½	0 0 6½	0 1 6	0 2 3	6 0 0	1 3 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(continued).

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 16 0	0 1 0	0 7 6	..	0 6 0	0 10 0	0 7 6	0 12 6	0 1 3	0 0 9	0 0 9	0 1 3	0 1 9	...	...
Pietermaritzburg, Natal	...	...	...	0 4 0	0 4 9	...	..	0 12 0	0 15 0	0 1 0	0 0 10	0 0 10	0 2 3	0 5 0	25 0 0	1 5 0
Port Alfred	...	...	...	0 12 0	...	...	...	0 7 0	0 13 0	...	...	..	0 1 9	0 2 6	...	...
Port Elizabeth ...	0 11 0	...	...	0 9 0	...	0 6 6	...	0 7 0	1 1 0	0 0 10	...	...	0 1 6	0 3 0	..	..
Queen's Town ...	0 12 6	0 17 6	0 14 0	0 14 0	0 12 1	0 16 9	0 15 9	0 12 0	0 15 0	0 2 6	0 0 9	0 0 8	0 1 6	0 3 6	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18 6	1 3 6	0 19 0	0 16 6	0 16 9	...	0 13 9	0 18 0	1 5 0	0 1 6	0 0 9	0 0 9	0 2 0	0 3 6	...	...
Worcester ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTE.—Returns have not been received from the Civil Commissioners of Aliwal North, Beaufort West, Cradock, Dordrecht, Graaff-Reinet, Tarkastad and Worcester.

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AGRICULTURE.

Reports and Prospects.

Bizana, *April 4th.*—Nice rains have fallen during the month. All kinds of stock doing well. Crops promise to be fair, but it is reported that locusts are damaging them towards the coast.

B. COTTERELL, A.R.M.

Butterworth, *April 2nd.*—During the past month copious rains have fallen throughout the district, and crops and pasturage are excellent. On the 27th ultimo a severe hailstorm fell in the southern

portion of the district, doing considerable damage to mealies and Kaffir-corn. In this village hardly a pane of window glass on the south side of the houses was left whole, some of the stones measuring two inches in diameter. Horses, cattle and sheep are in good condition. J. YOUNG, A.R.M.

Elliotdale, *April 3rd*.—A good deal of rain has fallen during the month, and the prospects of a good harvest are still good. The pasturage is good and stock are doing well. Several cases of farcy were reported and Veterinary Surgeon Hutchence was sent to examine them. Ten horses were shot owing to this disease. A full report has already been sent to the Government on this matter. Cattle are free from disease. W. HARGREAVES, R.M.

Flagstaff, *April 2nd*.—During the past month there was a considerable rainfall, but crops generally appear to have suffered and do not now promise the yield previously anticipated. The pasturage continues to be in excellent condition and stock are looking well. Young locusts hatched out along the banks of the Umsikaba, but the Natives allowed them to grow up and hop into their lands, where it was impossible to destroy them without damaging the crops. Other parts of the district have, I believe, been entirely free from their depredations. J. REIN, R.M.

Libode, *April 1st*.—Splendid rains have fallen in all parts of the district during the past month, and cereal crops are looking in best condition at present. A great deal of additional land has been brought under cultivation during the past season, and there is every prospect of an abundant harvest for the Natives, which will doubtless be of some consolation to them for the failure of their crops in past seasons through drought and locusts. The fruit crop has been a great failure this year, for a very destructive moth made its appearance and destroyed fruit of all kinds before it had a chance to properly mature. Stock of all kinds are looking at their best and there is no sickness or disease amongst them.

J. GARNER, R.M.

Ngqeleni, *April 4th*.—During the past month rain has fallen in abundance. A severe hailstorm swept through a portion of the district, doing damage to the Kaffir-corn crops in its path. Stock of all kinds are doing well, and there is a noticeable absence of horse-sickness, which is generally very prevalent during this time of the year. J. MORRIS, R.M.

Nqamakwe, *April 2nd*.—The mealie and Kaffir-corn crops throughout the district are looking very promising, though somewhat backward in consequence of late sowing owing to drought last year, and almost continuous rain since the end of January. A spell of sunshine is now required to bring them on. Outbreaks of lungsickness have been reported in different parts of the district, but other-

wise stock is healthy. As a result of the incessant rains grass is better than it has been for some years, and there should be good pasturage during the winter. C. Warner, R.M.

Peddie, *April 30th.*—The weather has been favourable for crops, which are better than they have been for several years past. The yield of mealies is fair, but the main crop is Kaffir-corn, of which there is a large quantity. The veld is good and stock healthy. Locusts are fast appearing in small numbers but have come too late to do much harm to crops. A. W. Preston, A.C.C.

Port St. John's, *April 4th.*—Fine rains have fallen during the past month, and a little warm weather is now hoped for to properly ripen the crops. The yield of grain promises to be a very fair one both in mealies and millet. Stock of all kinds are in good health and condition. W. J. Turner, R.M.

Tabankulu, *Mar. 30th.*—Nice rains have fallen throughout the past month, consequently the pasturage is excellent and all stock are in good condition. The crops are looking well and there is every indication of a good harvest. R. Wilson, A.R.M.

Tsomo, *Mar. 30th.*—The rainfall registered at this station during the month was 3·36 inches. The crops are looking well on the whole throughout the district, and I anticipate that a good harvest will be reaped. One or two hailstorms in the upper portion of the district have done considerable damage to standing crops. Stock are in good condition, large and small. W. Thomson, R.M.

Willowvale, *April 1st.*—The destruction of locusts still continues but owing to the tall "dobo" grass, the work is performed with difficulty. The mealies planted in January are a failure, owing to grub, but notwithstanding this, there is every prospect of a good average crop. No contagious diseases among stock have been reported during the past month. M. Liefeldt, R.M.

Introduction of Skilled Agricultural Labour from Europe.

(*Continued from page* 534.)

Part II.

CLASS OF LABOUR AVAILABLE.

Division of Italian Agricultural Labour into Two Classes.

Italian labourers may be roughly divided into two classes,—those who are bound by some tie to the land, whether as freeholders or as farmers on the métayer system, and those who are ordinary labourers working for a time wage. In considering the question of emigration this division is especially useful, for while emigrants may be drawn from either class, the difference in their conditions in the mother country is not without its influence on their respective positions in the country to which they may elect to emigrate.

A.—The Métayer Farmer and Small Proprietor.

The peasant who has any interest in the land in Italy must sacrifice such interest before he can leave the country; the mere fact of his going abroad to seek his fortune shows that he sees no hope of finding it in his native land; in his case strong ties have to be broken, and a certain, if unsatisfactory, position has to be deliberately sacrificed. This is therefore the class which emigrates, more frequently, with a view to permanent or at least lengthy settlement.

B.—The Casual Labourer.

The casual labourer, on the other hand, has little or nothing to sacrifice. He is often unmarried and has no family ties; the few sheep or goats, the couple of pigs, or the score or two of chickens, which eke out his miserable earnings, and without which he would inevitably starve, are easily sold, and he starts forth into the world a free man, his remaining chattels on his back, ready to travel to the ends of the earth if only he is offered the prospect of earning a little money, but generally with the intention of returning home some day or of moving on to new and more profitable labour markets. This, then, is the class from which temporary emigration is mainly recruited.

Similarity in Training and Living of the Two Classes.

Although, for the sake of convenience, we may divide the Italian peasantry into two great classes in this somewhat arbitrary fashion, it must be understood that there is no fundamental difference in their agricultural training,—they come of a common stock, their bringing up is identical, and the characteristics of the Italian peasant as summed up in Part I. of this report are shared equally by both classes. In some parts of Italy a regular class of farm-

labourers does exist, but as a rule there is no great *class* distinction, and labourers are recruited from among the younger members of farmer families. In the course of years the small holding becomes so infinitely divided that each fraction does not suffice to support its owner; the heir, who has the greatest interest, buys out his co-heirs or some neighbouring large landowner purchases their shares, and they become members of the casual labouring class, seeking work where they can find it. On the farm held on the métayer system the same state of things prevails; there are often more mouths to feed than the land will provide for, and some of the family must carve out a corner in the world for themselves. Thus a class of independent agricultural labourers is formed, who work for hire on the larger estates or seek employment in foreign lands.

Comparative Value of the Two Classes.

These day-labourers often work in gangs under a leader or contractor, who makes all arrangements and is responsible for them, and offers to supply labourers on this system for the Colonies are frequently made to H.M. Embassy here. The system has its conveniences, but it is well to point out that, quite apart from possible objections to this form of recruiting emigrants on the part of the Italian Government, labour taken direct from small peasant holdings or métayer farms is more likely to be steady and well-behaved than this gang-labour, which, from its unsettled character and general want of any restraining influence, is more liable to be tainted with anarchy or lawless principles.

The Italian is but faintly imbued with that fanatical love of soil which is so striking a characteristic of the French peasant. Small holdings are willingly sold or the métayer lease abandoned when there is a prospect of bigger gains beyond the seas, and the man who has sacrificed something in the old country generally makes the better colonist in the new.

Rate of Wages.

The question of wages depends so entirely on local conditions and the cost of living that, without an intimate acquaintance with the conditions that prevail in Cape Colony, it is difficult to name any fixed sum as likely to prove an acceptable wage to the Italian labourer. The emigrant himself can know nothing of what wages he ought to demand, and the first attempts to introduce foreign labour into Cape Colony are bound to be of a more or less experimental character. Perhaps information on this subject might be obtained if sought for in the Argentine Republic or other South American countries where the trend of Italian emigrants is greater.

In these circumstances I shall only venture here to state the one invariable principle which should regulate the rate of wages of all Italian emigrant labour, and to give, for purposes of comparison, a

few statistics of the wages offered to Italian agriculturists in other lands.

Wages Should Leave a Margin for Saving.

The principle to be observed in fixing the rate of wages is that the labourer should be offered sufficient to enable him to live decently in accordance with his lights and to put aside a small sum annually.

The watchword of all Italian emigration which is worth anything at all and which is not merely an overflow of the scum of the country, is "Save money." *No* Italian need be expected to emigrate to Cape Colony to earn a bare living wage. All those persons whom I have consulted on this question of wages, whether Italian officials or private landowners, have dwelt most strongly on this point.

Cheapness of Italian Labour.

How then, it may be asked, does Italian labour come to have a just reputation for cheapness? The answer lies, not in a willingness to live from hand to mouth, nor to work, day in, day out, for a bare living wage, but in the intense frugality and economy which is its birthright. An Italian peasant can save money from wages on which an English labourer would probably starve; what are necessities to the latter are unknown luxuries to the former. It would probably be no exaggeration to say that the living wages of an Italian peasant would be about a half of that of the English labourer, so that to offer him wages from which he may save a considerable proportion is not so formidable a matter as might at first sight appear.

Ambitions of Italian Emigrants.

All Italian emigrants, whether of the permanent or temporary class, leave their native country with ambitions which soar beyond the mere earning of their daily bread. The peasant proprietor who sells his land in Italy and migrates with his family, sacrifices an unsatisfactory certainty for the glamour of untried but well-defined hopes. If one were to ask any such peasant emigrant what his hopes were, the answer would almost inevitably be that he desired, by dint of hard work and economy, to become himself the owner of a plot of land in the new country, perhaps even to employ labour on his own account. And these men contrive by some miraculous means to fulfil this ambition, as may be seen by a glance at the Italian Consular reports on Argentina and Brazil.

The day-labourer, too, who goes to swell the ranks of that great band of temporary Italian emigrants who are found in every quarter of the globe, does not intend to return home empty-handed. Both classes must be offered some opportunity of saving money. This does not mean high wages, but it perhaps means that Italian labour may be a little more expensive than the farmers of Cape Colony might imagine, and I have laid particular stress on this fundamental principle of all satisfactory Italian immigration, because the Emigrants' Information Office in London state in the South African

Colonies' Circular for 1900 that "in Cape Colony very few farmer are willing to offer such wages or furnish such accommodation as would satisfy Europeans."

Competition with Native Labour.

From such books upon the Colony as I have been able to consult I gather that the labour which is found so unsatisfactory there is chiefly native labour retained at such a wage as even the Italian peasant would be unable to accept, and housed in a corresponding manner. The Italian, in respect of wages, would probably occupy a position between this cheap coloured labour and the higher-paid white labour at present available, and his superior skill and knowledge in the special branches of agriculture for which he is required, would in all probability compensate for the cheapness of the former and the knowledge of the language and the country, which in competition would doubtless be of immense advantage to the latter. I can only find one instance of Italian labour being brought into direct competition with cheap native labour:—Some years ago an attempt was made to induce Italian peasants to emigrate to Peru, where they were set to compete with coolies and native workmen in the sugar plantations, but the wages offered were so small and the climate so unhealthy that the attempt was soon abandoned, the Italians migrating to more profitable regions or turning their attention to other industries.

WAGES OF ITALIAN AGRICULTURAL LABOURERS IN ITALY AND OTHER COUNTRIES.

Difficulty of Comparing Wages Offered in Various Countries.

Comparison, in the matter of wages, is notoriously deceptive, chiefly for the following reasons:—

1. An average wage for any country, as quoted, for instance, in Government statistics, covers a multitude of local variations. In Italy itself the wages of agricultural labourers in the Southern provinces are about one-third of the wages earned in similar employment in Lombardy or Piedmont, so that an average agricultural wage taken for the whole country would represent wealth for the Sicilian but poverty for the Piedmontese.

2. A table giving the average wages and prices of the chief necessities of life in the various countries in which Italian agricultural labour is chiefly employed (such as will be found further on in the present report) is only of relative value and may even be misleading, for the commodity which governs the price of living for the Italian in one country does not necessarily do so in another. In Italy the staple diet, which fixes the wages of the labourer, is macaroni or polenta;* in large districts of Brazil it is mandioca, and so on. The Italian rarely touches meat and has probably never

*Polenta is a kind of pudding made from semolina or mealie meal.

tasted tea or beer, so that articles of consumption which have to be taken into consideration where British labour is concerned, have absolutely no effect on the wages of the Italian emigrant. The latter does not readily adapt himself to the diet and mode of living of the country to which he emigrates, and, if he cannot procure the food to which he is accustomed, finds some cheap substitute which answers its purpose. In South Africa he would probably live chiefly on mealies and rice.

Proportion of Wages which a Labourer can Save is the Only True Criterion.

Comparisons of wages, etc., in different countries, though apt to be misleading, are of some value and interest, and so I have quoted many of them here, but statistics of the crucial point of the whole question, the proportion of his wages, that is, which the labourer can lay aside in these countries, are unfortunately not to be obtained. In one instance only have I been able to glean information on this most useful point, but that instance applies to Argentina, the country which, of all others, is considered to be most adapted to Italian immigration, and where it flourishes exceedingly.

Wages, Living Expenses and Savings in Argentina.

In Argentina an unmarried workman, whose wages average 40 pesos* a month, calculating only 25 days' work to the month, can support himself (without any luxuries) at a monthly outlay of 25 pesos, leaving 15 pesos for clothing, unforeseen expenses, etc. In other words, when he has paid his necessary board and lodging, he can put aside 3/8 of his salary for all other expenses and economies. If, then, an Italian labourer could find board and lodging in those districts of Cape Colony where his labour is required, at 15 shillings a week (the minimum rate for country districts quoted in the Cape Colony hand-book), it is only fair to presume, on the analogy of Argentina, which is acknowledged to be the country most favourable to Italian immigration, that an acceptable wage would be about 21 shillings a week.

Average Wages and Prices of Commodities in Various Countries.

The following is a table of the average wages and average prices of some of the chief necessaries of life in Cape Colony (cf. Statistical Register, 1899), Italy and Argentina :—

* A peso is the standard silver coin, equivalent to 3s. 11½d. of British money.—Ed.

	Cape Colony. 1899.	Italy.	Argentina. 1899.
Average wages per day.	2/10 with food.	10d. to 1/8 with food.	6/4
Bread, lb. ...	3d.	2d.	6d.
Beef, lb. ...	7¾d.	5d.	6d. to 9½d.
Mutton, lb. ...	8d.	4¾d.	6d. to 7¼d.
Flour, lb. ...	3d.	2d.	4½d.
Potatoes, lb. ...	2d.	½d.	½d.
Sugar, lb. ...	3¼d.	7¼d.	8¾d. to 11d.
Rice, lb. ...	3d.	2½d.	
Pork, lb. ...	9¼d.	4¾d.	6d. to 7¼d.
Wine, per gal. ...	6/-	—	1/5 to 1/9
Coffee, lb. ...	7d.	1/7	

WAGES IN VARIOUS COUNTRIES.

The following particulars as to the wages earned by Italian agricultural labourers in various countries may be of some interest to intending employers, although, as I have already pointed out, their value is largely discounted by the varying conditions which determine them.

ITALY.

The prevalance of the métayer system in Italy, and the custom adopted in many districts of paying part of the wages in kind, makes it impossible to give an average wage for the whole country. Daily labourers are often only employed for the harvest and the vintage, and are generally recruited from a class of men who exercise some small industry on their own account, keeping a few sheep, pigs, or poultry. Their wages are very low, often not more than 8 pence or 10 pence a day, with a ration of polenta or macaroni. These people come down from their mountain villages at fixed seasons to work in the plains, either independently, or under what the Americans would call a "boss," who takes a contract to supply labour.

YEARLY WAGES IN LOMBARDY.

It is only in Lombardy, where agricultural conditions permit of labourers being employed by the year, that anything like precise statistics can be obtained. These labourers are housed gratis and get an average yearly wage of £5 15s. and an allowance in food-stuffs worth about £13 10s. besides a trifling percentage on the principal crops, which they may take in kind or in money at the current price. On many farms the labourers are given a patch of maize, and their earnings are further supplemented by the wages of their wives and families at harvest time and at other busy seasons.

In Lombardy the daily labourer's wage varies from 7 pence to 2/6 according to the season of the year and consequent demand for labour.

ARGENTINA.

WAGES IN THE PROVINCE OF MENDOZA.

In the Province of Mendoza, where the financial condition of Italians is generally good, and where they enjoy an excellent reputation for hard work and good conduct, the daily labourer works for nine hours in winter and eleven in summer, with a rest of 1½ hour at midday in winter and 2 hours in summer. Wages vary in accordance with the season and the nature of the work, and fluctuate between 4 and 8 shillings a day. Half of what a labourer earns suffices for his bare subsistence, so that he may save a small sum, and Italians who have started life as day-labourers in the Province frequently become tenants and even considerable proprietors.

WAGES IN THE PROVINCE OF LA PLATA.

In the Province of La Plata agricultural wages average £6 a month, besides board and lodging. During the period of the husking of the maize and the harvesting of the wheat and flax wages rise to as much as 10/- a day with board and lodging, and often, for the maize harvest, the labourers are paid by piece work at the average rate of 9½d. a sack of 160 lb. In a day's work a man may get together as many as twenty sacks. The food, which is given to the labourers in addition to their wages, consists of mutton, potatoes, biscuit, and a ration of "maté."* In the Province of San Luis wages are also high, a labourer earning 4/- a day with food and lodging, or 6/- without.

BRAZIL.

WAGES ON COFFEE PLANTATIONS.

Wages on the Brazilian coffee plantations are not usually high, averaging from £8 to £12 a year, with house accommodation. In addition to this paltry wage a plot of land is given, and sometimes a few pigs or sheep, and the labourer can usually make at least as much off these supplementary grants as from his wages. The system of time-paid labour, however, is not that generally in use in the coffee plantations of Brazil, as we shall see when we come to consider the question of the conditions of service most suited to Italian labour.

STATE OF LOUISIANA, U.S.A.

WAGES ON SUGAR PLANTATIONS.

From 10 to 12 thousand Italians (mostly Sicilians) are employed on the sugar plantations of Louisiana. They may be divided into two main categories, permanent and casual, the latter being only employed during the cutting and harvesting of the sugar-cane.

* Paraguayan tea.—ED.

Permanent Labourers.

The permanent labourers, who often have their families with them, sometimes remain for years on the same estate; they do not sign any contract with their employers and are free to go or liable to dismissal at 24 hours' notice on either side. The landlord provides them with a wooden cabin with one or more rooms in accordance with the size of the family, and with fuel. On most plantations they also have a small plot of ground assigned to them, in which they may grow vegetables or rear fowls. They are not provided with food. Wages are calculated by the day, the working day beginning at sunrise and ending at sunset, winter and summer alike. In summer 2 hours and 20 minutes and in winter 1 hour and 20 minutes are allowed for meals and rest. Wages vary from 2/8 to 2/11. During harvest time, the work being much more fatiguing and having to be carried on sometimes even at night, wages are raised to a dollar a day and 2/- for every six hours' work overtime. The wife and children of the labourer may work, and the women are paid from 1/8 to 1/10 a day, the children from 9d. to 11d. and more, according to the amount of work which they are able to perform.

According to the interesting report of Cav. Magenta, Italian Consul at New Orleans, from which these particulars are quoted, daily expenses for food and clothing are not more than 7½d. a day for adults and 5d. for children, so that a well-behaved labourer can save not less than £40 a year, or, if he have a family, even more, according to the age and capacity for work of his children.

Casual Labourers.

Casual labourers receive the same wages as the permanent hands and work on the same conditions. The unmarried men are housed in common dormitories. Their work is chiefly, if not exclusively, in demand at the season of the sugar-cane harvest, from the beginning of October till the end of January. These casual labourers, with overtime work on Sundays and at night, contrive to save about 100 dollars in 3 or 4 months. Some of the better of them send part of their savings to their families in Italy, others return to that country to come out to Louisiana again for the following season, and others again, who are wiser and know something of the country and the language, establish themselves in some village or town, opening a little fruiterer's or grocer's shop, and buy small plots of ground which they lay out in vegetables and fruit; and finally, if their business prosper, as it almost always does, they send for their families from Italy.

The writer of the report from which I have gleaned the above particulars speaks of the condition of these people as being in every way a most satisfactory one, but does not attempt to encourage further emigration, fearing a glut of Italian labour and a consequent reduction of wages.

I have dwelt at some length on the condition of Italian agricultural labour in Louisiana, because, of all countries which employ such

labour, it seems to be the one in which conditions most closely resemble those of Cape Colony.

CONDITIONS OF SERVICE.

Italians will adapt themselves to almost any conditions of service, for conditions in this country vary in every district and even on different properties in the same district.

DIVISION OF SUBJECT.

They may, however, be divided into two main categories, those which are based on time—payment, that is, by the day, the week, the month, or the year; and those which are based directly on the production of the soil.

I. CONDITIONS OF SERVICE BASED ON TIME WAGES.

I have already pointed out the disadvantages of Italian labour when engaged at a simple time wage irrespective of the work produced, but if the farmers of Cape Colony have a preference for labour engaged under such conditions, they would have little difficulty in finding Italian labourers willing to accept them. If any large number of labourers were to be employed at a time wage overseers would have to be appointed to ensure their doing their full complement of work, and hours of labour and general conditions should be distinctly stipulated

QUESTION OF FOOD AND LODGING.

The question of food and lodging should be settled in accordance with local conditions. The Italian labourer himself would be willing to accept service with or without board and lodging, but the Italian Government will not encourage emigration unless they have some guarantee that their subjects will be properly lodged and fed, and experience shows, moreover, that if left to themselves, the lot of Italian immigrants usually falls far short of what is desirable in both these respects. In the United States of America the insanitary condition of Italian workmen's dwellings is a frequent source of trouble to the Authorities, and it is found that the Italians, rather than adopt the diet of the country, which is either unpalatable to them, or which they do not understand, persist in trying to live on the food to which they are accustomed in their own country; this food is often only to be found of the poorest quality, is even sometimes more costly than the wholesome ordinary diet of the native workman, and the custom results in much disease and unfitness for work. In these circumstances it would seem desirable that—in the case, at any rate, of labourers engaged at a time wage—food and lodging should be provided by the employer.

II. CONDITIONS OF SERVICE BASED ON PRODUCTION OF THE SOIL.

When we pass to the conditions of service which are ruled by the production of the soil we find an infinite variety of systems prevail-

ing, both in this country and in those foreign lands where Italian labour is habitually employed in agriculture. These systems may be divided into two main categories, namely:—

A. Those which are based on a simple division of the produce in pre-arranged proportions.

B. Those in which a certain number of plants (vines, olives, fruit trees, etc.) are entrusted to the care of the cultivator for a fixed time, and wages paid in accordance with the number of plants which he has to tend.

A. The Métayer System.

The métayer system (mezzadria) in its simplest form is as follows:—

The landlord supplies the land and the working capital, the tenant supplies the labour, and the produce is equally divided between the two.

Variations in System as Found in Italy.

This simple system, however, is not always found to be fair in practice, and has consequently become much modified in many districts in accordance with local requirements. In some cases, for instance, where cultivation is easy, it was found that the half share given to the peasant was more than his labour was legitimately worth; in other cases the labourer's half share gave no adequate return for the work expended and was not sufficient to support him and his family. In these circumstances an infinity of local usages have sprung up; in some districts the landlord and the tenant share the ownership of the stock on the farm, the tenant in this manner contributing towards the working capital, while the landlord gains a further advantage in the extra care which is lavished by the tenant on the live stock, when he has a proprietary interest in them. On other estates, where conditions are not so favourable to the peasant, he is entitled to a portion of seed-corn and other allowances. Sometimes the share of the landlord is handed over in money instead of in kind, sometimes certain crops are excepted from the division and given up entirely to the landlord, who pays back a fixed proportion of their value. Such are a few of the variations in the "mezzadria" system as practised in Italy, but they are so numerous and so intricate that it is impossible to deal with them here at any length; the principle in all of them, however, is the same—a division of the produce of the land in accordance with the value of the capital and labour expended upon it. The system has been in force since ancient Roman times in one form or another in almost every district of Italy, and is generally found to work well; it has been introduced into many of those countries where Italian agricultural labour is employed, and it is usually recommended and encouraged by Italian Consuls in such countries.

SYSTEM AS FOUND IN ARGENTINA.

Mezzadria in Argentina.

The following is the form of "mezzadria" which is in force in Argentina. The owner hands over to the peasant a holding of a 100 acres or more, working tools, the necessary stock, and the seed for cultivation. If there be no dwelling-house on the property the owner suppiles the necessary materials and the peasant is responsible for its construction. For the first year the owner supplies or guarantees the cost of living. At harvest-time the crop is sold, the cost of the peasant's keep, of the seed supplied, of harvesting, of threshing, as well as a sum for the wear and tear of agricultural implements, is paid from the gross receipts, and the remaining profits are divided equally between the owner and the peasant.

In other cases the owner hands over the land and only advances seed corn. The peasant provides the stock and implements. The value of the seed corn advanced, the expenses of harvesting and threshing, etc., are divided equally between the owner and the peasant, and the whole profits on the crop are then shared in equal portions between them.

Another system, called "terzeria," is in use in the less fertile parts of Argentina, by which the expenses of harvesting, threshing, etc., are defrayed from the gross profits, and one-third of the remainder handed over to the owner, the peasant keeping two-thirds for himself.

Advantages of Metayer System.

The "mezzadria" is applicable to holdings of almost any size, and if Italian peasants are to be employed in Cape Colony, and if the utmost value, both to employer and employed, is to be got out of the labour expended, it would seem that either the "mezzadria" in some form or the system which is now to be mentioned (B) would be suitable for adoption in the Colony.

B. System in which Labourer is Entrusted with Care of a Certain Number of Plants.

The system in which a certain number of plants is entrusted to the labourer, who makes his return and is paid accordingly, is not much in use in Italy, but it has been largely adopted in the coffee plantations of Brazil in connection with Italian labour; in that country it has on the whole succeeded well in the past, though the great fall in the price of coffee in recent years has done much to make the lot of the Italian immigrant a very hard one.

The labourer is entrusted with the care of a certain number of coffee plants and is paid at rates which vary from 60 to 800 milreis (£7 15s. to £95) per annum for every thousand plants; the great difference in the prices paid is due to variations in the circumstances of cultivation and in minor conditions of service; the labourer who is only paid £7 15s. per 1,000 plants is given the use of a plot of land sufficient to supply all his household wants, with lodging,

and pasturage for his beasts, while the higher prices, from £60 to £95, only apply to those cases in which the plants require special care and attention, as in the formation of a new plantation. The number of mature plants which can be properly cultivated by one family is computed at from 4,000 to 5,000, which at the average rate of about £11 per 1,000 plants brings up wages to from £44 to £55 a year for the family. In almost all cases some extra concession is made besides the actual pay: the peasant is allowed to utilize the spaces between the coffee plants for his own purposes, is given a plot of ground for his own use, or allowed pasturage for sheep, goats or pigs; without some such subsidiary industry he would be unable to save any money, his wages representing a bare livelihood.

In the case of new plantations another system is frequently adopted, by which the entire crop is handed over to the cultivator for the space of four years, but as it presupposes a certain amount of capital in the hands of the labourer it is perhaps scarcely worth while to dwell upon it here.

Participation of Peasant in Produce.

It is a fact worth noting that wherever the system of paying wages in accordance with the number of plants cultivated is found at its best, there the peasant invariably participates directly in the produce of the crop, receiving a small percentage of the coffee gathered, in addition to his regular wages.

I have spoken at some length of this system because the crops specially mentioned in the enquiry of the Government of Cape Colony, namely, vines and fruit trees, seem peculiarly suited to its adoption. In any case it should be remembered that the principle of the labourer participating directly in the fruits of his labour is the one which most frequently rules the conditions of Italian labour, and has been proved to be the most satisfactory one both in this country and abroad.

RECRUITING AND TRANSPORT OF EMIGRANTS.

The matters dealt with under this heading fall into three main divisions.

Division of Subject.

I. Recruiting of suitable persons in Italy and their transport to the place of embarkation.

II. Transport by sea.

III. Reception on arrival and arrangements for transport to eventual destination.

Italian Emigration Bill.

Before proceeding to examine these points separately it would be as well to point out that a Bill is at present before the Italian Chambers, which, if it become law, will considerably modify all the arrangements at present in force with regard to each of these stages of emigration. The whole question has been minutely examined by

the Parliamentary Committee mentioned in the first part of the present Report, and the Bill in question is the result of its labours. Although there may be some modifications in the Bill as it at present stands it seems likely that it will be substantially adopted.

In these circumstances it is impossible to give any detailed information on the question of transport, and I shall confine myself to a brief outline of the present system and to indicating the changes proposed in the new Bill.

I. Recruiting of Emigrants and their Transport to Place of Embarkation.

By the system at present in force the recruiting of emigrants is largely carried on through the agency of the shipping companies interested in the emigrant traffic; peasants are enrolled by middlemen in various districts, and the system often leads to much extortion and swindling to the detriment of the ignorant and helpless emigrants. The emigrants usually pay their own fares to the port of embarkation.

Provisions of Bill at Present under Discussion.

By the Bill which is at present under discussion, not only will certain classes of persons, such as those who have others dependent on them, be forbidden to emigrate, but the whole system of recruiting will be systematized and the enrolment of emigrants by unauthorised persons be made illegal. A Board of Emigration will be instituted, and under it Emigration Committees will be appointed in all the chief towns of the Kingdom, Inspectors of Emigrants installed at all the chief ports of embarkation, and Institutions for the benefit of the emigrants founded at those same ports.

By means of this highly organized system the recruiting of a good class of emigrants for work at fair wages and under good conditions will be immensely facilitated. Meanwhile, in anticipation of the passing of this Bill, the Italian Government express their willingness, on being provided with assurances as to the satisfactory nature of the employment, wages, etc., to be offered, to recruit the required number of agriculturists through the agency of the local authorities.

II. Transport by Sea.

The want of a regular line of steamers running between Italy and Cape Colony has long been the main obstacle to emigration on any large scale between the two countries.

Route.

The German East Africa Company has steamers running to Delagoa Bay and Natal, but the cost of transport from either of these ports to the agricultural districts of Cape Colony, where foreign labour is required, would be greater than the cost of transport from Naples or Genoa to Southampton or London, where a regular service of

steamers to Cape Town may always be found. This route, via London, is not unfrequently utilized by the few Italians who find their way out to South Africa.

FARES.

Third class passages to London are booked from Naples and Genoa at £4 and £3 10s. respectively, and passages from London (open berths) cost from £8 8s. to £10 10s.

THE LAS PALMAS ROUTE.

In answer to enquiries made at Naples I am informed that there is an alternative route, from Genoa viâ Las Palmas, passengers embarking at Genoa on the "Veloce" steamers and transhipping at Las Palmas on to those of the Union-Castle Company. The cost of a third class ticket from Genoa to Las Palmas is £5, and from Las Palmas to Cape Town £8 8s., so that the cost of the whole journey by this route (£13 8s.) compares favourably with the fares charged by the German East African Line, by which a third class ticket from Naples to Delagoa Bay or Natal costs £15.

The Union-Castle Line moreover declare their willingness to take into consideration the practicablity of any of their steamers calling at Naples, an arrangement which would enormously facilitate matters by doing away with the necessity of transhipment at Las Palmas and the frequent difficulties as to connections, loss of time, cost of maintenance of the emigrants, etc., which must arise therefrom.

AIDED OR SPONTANEOUS EMIGRATION.

It is very improbable that any considerable number of the class of labourers required could be found able or willing to pay the cost of such a long and costly voyage. It is true that there is a yearly increase in spontaneous emigration to America, but the journey is not so expensive, and is paid, in a large percentage of these cases of so-called spontaneous emigration, by friends and relations of the emigrant, who are already settled in the new country and have contrived to save a little money there. A limited number of free passages might be issued by the Cape Government or by private individuals, and if emigration were once started in this manner and proved successful, a portion only of the fare might be offered to succeeding emigrants, and eventually spontaneous immigration would be almost sure to follow and might be left to take its natural course.

PROVISIONS OF NEW EMIGRATION BILL AS AFFECTING THE SEA VOYAGE.

The new Emigration Bill proposes very strict regulations with regard to emigrant ships, regulates fares, and confines the traffic to licensed individuals or companies. Provision, however, is made for the case of emigrants desiring to go to a country to which there is no recognized service of emigrant ships. A clause forbidding the transhipment of emigrants at intermediate ports without the special

permission of the Board of Emigration, would affect the traffic to Cape Town viâ London or Las Palmas, but the Board would probably make no difficulty about granting this permission if it were applied for by a respectable Company.

III. Arrival in the Colony.

Should the Cape Government decide in favour of encouraging immigration from Italy, the first arrivals would doubtless land under contract, would be distributed forthwith to their various destinations, and would occasion no trouble at the port of disembarkation; but it would be well to bear in mind that if once Italian labourers take a foothold in the country, find that conditions are favourable, and prosper, things at once change their aspect, and the problem of dealing with the almost inevitable rush of Italians to the new land of promise becomes a most serious one.

Dangers of a Rush of Italian Emigrants to the Colony.

In every country to which the flow of Italian emigration has been at all extensive the same difficulties have had to be met:—ignorant peasants arriving with golden hopes and empty pockets, compatriot sharks with the means of immediate relief at the price of human life and inhuman toil, a horde of destitute aliens thrown on the charitable resources of the country, and—eventually—tardy legislation to regulate or even to put a stop to the immigrant traffic altogether. These countries have allowed the flood to assume dangerous proportions, when a little foresight and a little judicious legislation might have regulated it from its source.

Padrone System.

In the United States of America the "padrone" or "boss" system has been largely responsible for the outcry against Italian immigration. The question is too large to be dealt with in detail here, but it is enough merely to explain the system and hint at its dangers.

Wherever Italian labour is required, it will always be found that there is some Italian, a little better educated or better provided with capital than his unfortunate compatriots, who is ready to exploit them for his own benefit. He will sometimes begin operations upon his unfortunate victims from the moment of their leaving their native villages, advancing tickets for the voyage, gulling them with fables of miraculous fortunes awaiting them beyond the seas or providing them with the sum of money which is required of them by some countries, as a proof of their not being destitute, before they are allowed to land. In return the peasant sells his life and labour to the "padrone," and the new Italian Bill proposes strong measures to put a stop to this evil by regulating the recruiting of emigrants, as already explained.

But the swindler more often lies in wait for his victims at the port of arrival; he himself has perhaps been settled in the country for several years and speaks the language, an inestimable advantage to him when we consider with what simple folk he has to deal; he acts as money-lender, employment agent, banker, and labour contractor, and in each of these capacities he grinds down his unfortunate victims and makes them his slaves, transferring the greater part of their hard-earned wages to his own pocket. The "padrone," properly so-called, acts in concert with these sharks, finding employment for gangs of destitute peasants, compelling them to supply themselves with the necessaries of life at his own store and at his own prices, and taking a percentage of all their earnings.

The Padrone System in America.

To such a pitch has this state of affairs arrived in the United States that no emigrant is now allowed to land if already engaged under contract, and complaints as to the dangers of the system and the difficulty of suppressing it are continual. When legislation on the subject was first instituted in the United States the evil was already too deeply planted to be easily eradicated, and a large number of Americans are now in favour of the Lodge Bill, which, by forbidding the immigration of illiterate immigrants, would strike a fatal blow at all Italian immigration.

The new Italian Emigration Bill provides for the appointment of travelling inspectors to visit those countries to which Italian immigration is most prevalent and report on the condition of Italian subjects there.

Conclusion.

In conclusion, I can only sum up by saying that Italian labour is easily obtained, efficient, well-behaved and economical, and, if properly organised and well managed, I see no reason why it should not amply satisfy all the demands of the farmers of Cape Colony.

Rotation of Farm Crops.

A correspondent of the Melbourne *Weekly Times* calls attention in the following manner to this very-important subject and says it is "*what is required in Australia.*" We may say that it is a necessity of continued cultivation in any other country, South Africa amongst the rest. In many cases where arable lands have become exhausted by constant cropping, they have been greatly improved by intelligent rotation of crops and green manuring, and it is by the employment of these methods that the fertility of the English soil has been maintained, as much as by the supply of artificial manures. Of course, the combined operation of all these is desirable where good crops are grown continuously :—

"*The Evil of Continuous Cropping.*—Continuous cropping is carried on by farmers in all parts of Australia where cultivation takes place, and the object of many farmers, though happily not all, would seem to be to exhaust the land as quickly as possible. The same wasteful system prevails in the United States and Canada, as also in Sonth America, where agricultural settlement has taken place. Wherever land is plentiful and can be obtained with facility, many farmers are content to take as much from it as possible in a few years; and when the soil will no longer yield a payable return it is allowed to lie idle, and these 'exhaustive cultivators' move on to other localities, where the same wasteful system is carried on by them. Another reason why continuous cropping is so much practised in newly-settled countries is that so large a proportion of the population become cultivators, and that a considerable amount of their produce has to find a market in other parts of the world. The densely populated countries of Europe are now not able to fully supply themselves with food, and there has of late years been a great and increasing demand for breadstuffs. This steady demand for grain has induced our farmers to make wheat their staple crop, as they can always depend upon finding buyers and they are able to realize their profits quickly.

Mixed Farming.—It is impossible, however, to continue the exhausting system, which has already changed a large area of originally fertile land to almost a barren waste, capable of growing only a scanty crop of grass. We must adopt a more reasonable system in the treatment of the land, or otherwise the consequences will be serious a few years hence. It is only by a mixed system of farming that Australian agriculturists will be able to work their land permanently with profit to themselves and for the good of the community. They must cultivate a greater variety of crops and pay more attention to the rearing of live stock than at present.

Crop Rotation Essential.—In a sound system of farming the question of crop rotation receives due attention, as it is one of the essential elements of success. Scientific and practical men are fully agreed in urging its importance in the old world, and the same line of

reasoning will apply to farmers in Australia. Experience teaches plainly that a rotation is necessary to maintain the fertility of the soil, and, as a rule, every farm in Great Britain is worked upon a system which is found to be adapted for the locality and the nature of the land. The results of this practice afford ample proof that it is based upon correct principles.

Modern Science and Ancient Experience.—Though by the aid of modern science the alternation of crops has been brought to nearly a perfect system, yet the practice is not, as many suppose, of recent origin. The early writers upon agriculture, even from the times of the ancient Greeks and Romans, have urged the advantages of a succession of crops, their opinions being based on practical experience, though they were unable to explain the reasons why they were satisfied that a variety of crops grown in rotation would give a better return from the land than could otherwise be obtained.

Why Rotation is Beneficial.—Several theories have been advanced to explain how the growth of the crop can influence a succeeding one; but though the fact is well established, scientists differ somewhat in their conclusions. De Candolle, a celebrated French botanist, assumed that plants threw off secretions from their roots that poisoned the soil for the same species, but which served as nutritive material for other plants. The excretory theory was for a long time popular, but ultimately disproved, and Liebig's theory is now generally accepted as affording the best explanation of the benefits of crop rotations. Liebig's is generally known as the mineral theory, and according to it plants obtain their mineral or ash constituents from the soil and derive their supply of carbon and nitrogen from the atmosphere. As crops differ in their constituents it is assumed that their demands upon the soil will vary, and hence the advantage of a rotation. Crops, according to this theory, are exhausting when their ash constituents predominate, and are restorative when they contain a large proportion of nitrogen.

Cereals Exhaust; Leguminous Crops Restore.—Cereals, including wheat, oats and barley, are prominent among the exhausting crops, while leguminous plants are highly restorative. Clover, peas and beans are highly nitrogenous crops, and they have a wonderful effect upon succeeding grain crops. The well-known agriculturists, Messrs. Lawes and Gilbert, in the course of their experimental investigations at Rothamsted, obtained nearly as much wheat in eight crops, alternated with the same number of bean crops, as in sixteen continuous wheat crops. The production of wheat every year was, in fact, nearly doubled by cultivating it alternately with a leguminous crop. Experiments like these have proved that the exhausting effects of a crop are not to be measured exclusively by what is removed from the soil.

Rest or Restore.—The wheat-growing areas of Australia are being rapidly exhausted by the same crop being removed from the land for a number of years in succession, and as a consequence there is a marked falling-off in the yield. The only remedy for this state of

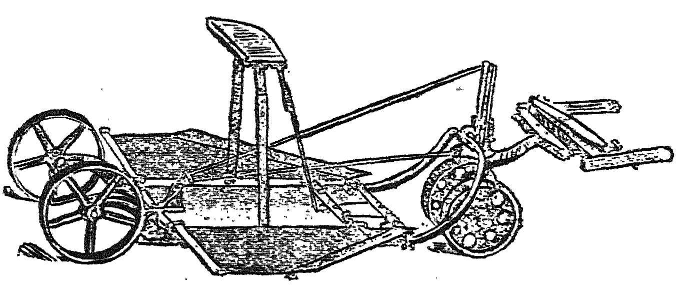
affairs is to rest the land by fallowing, or to grow restorative crops in rotation. In some of the older districts pea crops now play an important part in the system of cultivation, and their value for restoring grain-sick land is duly appreciated. These and other leguminous crops are, it is to be regretted, not generally cultivated as yet, though they are gradually coming into favour. There is no reason, however, why they should not be cultivated in all districts where grain crops are grown.

Though it has not received much attention hitherto in this part of the world, the subject is an important one for farmers, and we advise them to test the value of a rotation system of cropping by making experiments.

In countries where for a long period agriculture has been carried on systematically, it has been found necessary to study the requirement of the land in order to preserve its fertility, and cultivators are careful to vary their crops and return back something in the shape of manure. Without due care the land in England and other countries would ages ago have become exhausted and have refused to give a fair return to the cultivators, and as a natural result the supply of food must have been seriously curtailed. Experience has taught the farmers of the old world that they cannot exhaust the soil with impunity by continuously taking the same substances from it in the shape of grain crops, and that in order to keep their land in good heart something must be given in return for what is taken from it. In newly settled countries, however, the teachings of science and experience are too generally ignored by agriculturists, though system in farming is quite as essential as in other parts of the world."

EDITOR.

American Mealie Harvester.



MEALIE STALK CUTTER.

This machine, the invention of the Foos Manufacturing Company, is said to cut corn quicker and more easily than by any other process. It can be adjusted so as to leave the stubble from 6in. to 14in. high as may be desired. It is simple in its operation, and can be

worked by a lad, no previous experience being required. The wings and knives are made of steel, it rides on four wheels, so that it runs steadily, and is of easy draught. It has a double castor wheel in front, so that it can be easily turned round, and special safety shafts, which are a protection to the horse and a guide to the machine. It is light, strong and durable, and has stood the test of work for three seasons.

Australasian.

Whole Mealie Sheaves for Silage.

A correspondent of the *American Agriculturist* in reply to enquiries gives particulars of this method of "ensiloing whole corn":—

"My silo is 18 x 18 ft. and 24 ft. high, and is located in one corner of my barn. The corn is given no treatment whatever before it is put into the silo, but the bundles are stowed away just as they come from the corn binder. I take great care to have the stalk fine by planting the corn thickly. This is accomplished by using about 20 qts. of seed to the acre where the land is rich, and less where it is poor. Pride of the North has given me best satisfaction.

After the corn is taken out of the silo it is fed directly to stock, and is given no treatment in the way of running through a feed cutter. If the stalks are small, the cattle will eat it up as clean as they will silage that has been cut. In fact, I think they will eat more of it, as they do not like the sharp edges of the cut silage.

I have filled my silo with whole corn for the last 12 years. I have never failed to have sweet ensilage. My experience and observation lead me to believe that it is much better than when cut. The corn plant or stalk is a small silo in itself. We ought not to cut it and thus expose the juices directly to the air, causing undue fermentation, which will make much more sour ensilage than if the corn is not cut. Then, too, it is much easier to put the corn in the silo and also to feed it when needed."

As the usual plan is to cut up the mealie stalks, and other stuff, before putting them into the silo, this plan of filling it with whole sheaves would be a great saving of labour. We shall be pleased to hear from any of our readers who have made any trials of silage making of any similar plan as above described.—Editor.

Exports and Imports of Agricultural Produce during the Year 1899-1900.

The quantities and values given below are from the Customs Returns in the *Government Gazette* of March 1st last :—

AGRICULTURAL PRODUCE EXPORTED.

ARTICLES.		Quantities. 1899	Quantities. 1900	Declared Value. 1899 £	Declared Value. 1900 £
Aloes ...	lb.	532,057	475,362	3,095	3,047
Argol ...	"	137,258	117,483	2,482	2,030
Corn, Grain and Meal, viz.:					
Barley ...	lb.	270,674	39,055	1,186	199
Beans and Peas	"	1,695	845	19	9
Bran ...	"	3,735,100	2,723,750	9,357	6,226
Flour ...	"	251,030	593,000	1,636	4,298
Maize ...	"	9,598	105,610	42	561
Oats ...	"	2,478,585	427,079	10,062	3,114
Wheat ...	"	5,638	6,477	41	39
Feathers (Ostrich)	"	373,182	412,832	842,000	876,801
Flowers and Grasses (Dried)	"	265,972	325,403	17,004	23,330
Fruit (Dried) ...	"	34,119	50,233	571	826
Fruit (Fresh) ...	value £	...	...	6,033	8,304
Hair (Angora) ...	lb.	12,777,306	9,027,361	779,899	489,905
Hides (Ox & Cow)	number.	64,077	26,891	...	...
	lb.	1,684,096	473,295	34,012	11,378
Horns (Ox and Cow)	number.	289,564	152,255	4,214	2,692
Horses ...	number.	93	17	1,913	844
Skins (Goat) ...	number.	1,190,874	1,002,338	...	...
	lb.	3,736,233	3,164,249	102,324	91,474
(Sheep) ...	number.	2,543,269	2,434,622	...	...
	lb.	12,871,256	11,393,788	271,946	243,948
Spirits, all sorts ...	gallons.	22,704	34,109	7,621	12,162
Wine ...	"	75,469	109,850	19,224	29,541
Wool (Sheep's), Fleece Washed	bales.	5,653	3,631	...	...
	lb.	1,585,522	1,026,036	64,746	34,946
Scoured	bales.	25,192	25,454	...	...
	lb.	4,538,297	4,555,665	293,561	264,282
Grease	bales.	168,865	59,182	...	...
	lb.	63,165,787	22,089,335	1,825,597	538,581
Total value of Agricultural Produce Exported				£4,298,585	2,648,537

TOTAL VALUE OF EXPORTS OF ALL KINDS DURING THE YEAR 1899-1900.

	£	£
Copper Ore	446,985	498,552
Diamonds	4,135,583	3,433,832
Fish, Salted or Cured ...	12,835	1,419
Gold, Raw	13,815,683	336,795
Ivory	496	454
	18,411,582	4,271,052
Agricultural Produce ...	4,298,585	2,648,557
	£22,710,167	£6,919,609

Though the decreased importation of raw gold chiefly accounts for the great difference of £15,789,028 (over fifteen and three-quarter millions sterling) for the two years, yet the disturbed state of the country has affected the production and export of agricultural produce. This is seen in the returns of wool and mohair as shown in the totals of the two years given below :—

PASTORAL PRODUCE.

Wool 1899 ...	Value £2,183,904	
„ 1900 ...	„ 837,809	
		Decrease £1,346,095
Mohair, 1899...	Value £719,899	
„ 1900...	„ 489,905	
		Decrease £229,994
Ostrich Feathers 1899 ...	Value £842,000	
„ 1900 ...	„ 876,801	
		Increase £34,801

It will be seen by the report that the greatest decrease in the quantity and value of the wool exported is in grease wool. The scoured is almost the same.

The lower prices prevalent during last year has tended, too, to reduce the total value. Altogether, it is an unsatisfactory return, but no worse than could be expected under the circumstances of anxiety and trouble prevalent in the country. Angora farming also has suffered considerably, and it is to be feared that the number of goats as well as sheep are reduced considerably, and it will be a matter of interest to get the numbers shown in the coming census. However, we must hope for more peaceful and prosperous times.

Ostrich feathers show increase in both quantity and value; the total value of the export of the last year being more than that of

wool. This, of course, is due to the failure of the wool export, but it is a position of affairs no one would ever have ventured to predict.

Fruit and flowers show an increase in value, both of which articles of export will, we believe, be yet increased.

IMPORTS OF FARM PRODUCE.

VALUES OF AGRICULTURAL PRODUCE DURING THE YEARS 1899 AND 1900, SHOWING THE INCREASED IMPORTATION OF THE DIFFERENT ARTICLES.

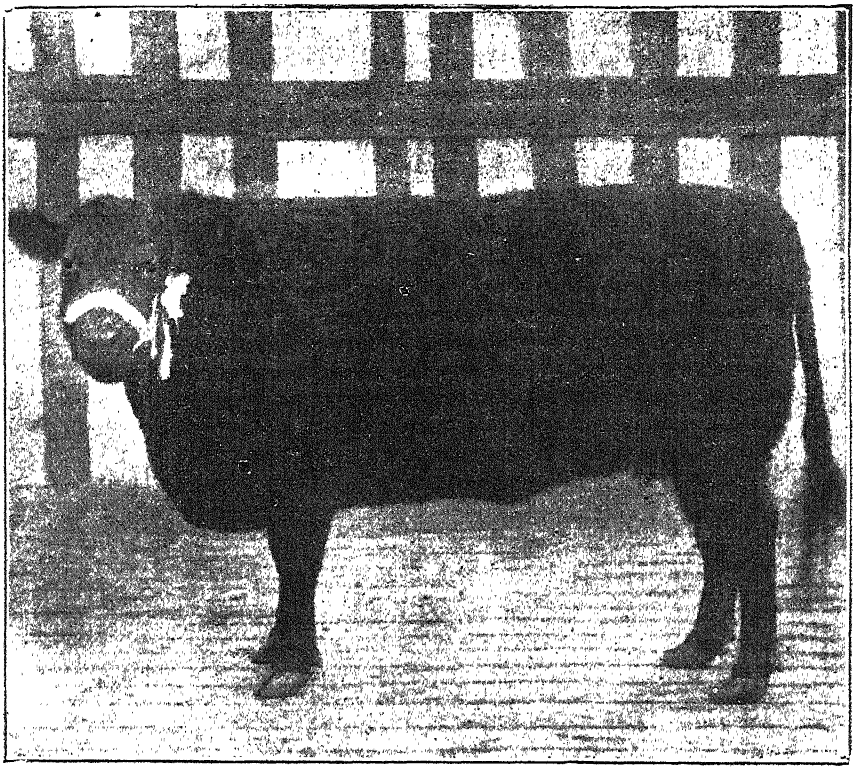
	1899	1900	Increase.
Butter, including Margarine ...	£137,236	£214,423	£ 77,187
Cheese	67,181	89,481	22,300
Chicory	8,896	10,658	1,762
Corn and Meal:			
Flour	64,070	154,035	89,965
Maize	92,964	228,129	135,165
Oats	9,658	110,066	100,408
Wheat	503,825	641,656	137,831
Meats, preserved	243,703	329,838	86,135
Spirits of all sorts	200,741	247,702	46,961
Tobacco, Unmanufactured ...	5,986	28,865	22,879
" Manufactured ...	69,656	73,816	4,160
" All other sorts ...	100,245	205,925	105,680
Wine	51,599	85,763	34,164
	1,555,760	2,420,357	864,597

The above tabulated statement of the importations of farm produce for the years 1899 and 1900 show there was an increase in the value of all articles without exception, making a total increase of £864,597; the largest increase being on wheat (£137,831). The totals for our breadstuffs bill for the year being for flour £154,055 and wheat £641,656, or for both nearly eight hundred thousand pounds (£795,691).

Mealies also figure largely in the returns, as last year's import was over half a million muids (519,064), valued at £228,129, being an increase of £135,165. With better times and good seasons they will not be imported in future. We expect oats, too, will show a large increase. In the value given for meats last year is included £208,701 for condensed milk, being an increase of £38,411.—EDITOR.

STOCK FARMING.

Cross Breeding.



CROSS-BRED HEIFER, BEAUTY.

This heifer was the progeny of a Shorthorn sire and an Aberdeen Angus dam, and we learn from the *Live Stock Journal* that when the subject of the above illustration was taken, she was two years and eleven months old, and her live weight 1,890 lb. She was awarded the first prize Challenge Cup and championship at the Leeds Smithfield Club Show, 1900, also the Society's special prize and Challenge Cup, valued at 50 guineas, as the best animal at the Fat Stock Show at York, December 1900.

That crossing two pure-bred animals, of different breeds, has often resulted in the production of specially good and useful progeny has long been known, and till Bakewell's time it was a plan adopted to obtain improved farm stock. As the result of the first cross was

often a larger, and in some points better, animal than either of the parents, it was thought that if this crossing and special breeding with the cross-breds was kept up, great improvement would be secured. It was found, however, that this hoped-for improvement in a herd or flock over a series of years was not realized.

It is found that when cross-breds are bred with each other, that atavism or throwing back comes into specially vigorous operation, and in two or three generations the reproduction of ancestors, or rather their resemblances, is so great that in a herd there will be a great variety of types and qualities, with retrogression rather than improvement. In breeding from pure-breds, there is a certainty that the progeny will be, though a better or worse animal, true to the breed, but with cross-breds one cannot tell what to expect. Some good has been done by the introduction occasionally of alien blood into a herd of pure-bred stock, but it is always done by keeping to pure blood on one side, and can only be effected with intelligence and care. One of the most famous and successful of these crosses was that made by Charles Collings when he introduced the Galloway blood into his Shorthorn herd. He was desirous, so Youatt tells us, of making this cross with the Galloways because they were calculated by their deep massive frames and short legs to bring the Shorthorns nearer the ground, and dispose their weight in a more compact manner; their hardy habits would be essentially useful, and the quality of their flesh and hair was such as to render the experiment safe. Having resolved to make this cross, his plan was to take one cross and then breed back to the Shorthorn, the only method, by the way, in which crossing can be successfully adopted.

Bolingbroke, a Shorthorn bull, was put to a beautiful red-polled Galloway cow. The produce, a bull-calf, was in due time put to Johanna, a pure Shorthorn ; she also produced a bull-calf. The grandson of Bolingbroke was the sire of Lady by another pure Shorthorn dam, and from Lady sprang one of the most valuable strains of the celebrated herd. It was, as we see by the above account, no haphazard affair, but a well-considered experiment most carefully carried out, and the record tells us it was pre-eminently successful. But while there may be a few cases where such experiments may be repeated, except when breeding for the butcher, it will be wisest and best to keep to pure blood.—EDITOR.

Colonial Rambouillets.

In No. 10, vol. xvii., is a short notice of the introduction of sheep of this breed into the country by Mr. W. Rogers of Glencairn, Cathcart Division, and he thus writes about them and their progeny :—

"I thought you would like to hear how the Rambouillet sheep are behaving themselves which I brought out from France in 1897.

The least I can say is, that I am more than satisfied with them; in fact, they have in every way exceeded my most sanguine expectations. Although they have been running on the grass winter and summer, and never housed, they have never developed any symptom of disease of any kind. Their progeny are making larger carcases, and producing heavier fleeces of wool, than the imported parents. I attribute the highly satisfactory growth and development of this pure race of merinos to their marvellous constitution. Not having had any mixture of foreign blood for upwards of 120 years, the breed has not been victimized by the introduction of blood from weakened sources. All breeds of stock have constitutional weaknesses of a special kind, and great danger is to be apprehended from a stud flock, where the pernicious system of crossing has been practised. What I like so much about this sheep is, that they require no pampering. They thrive and do well on the natural grasses of the country and do not require to be housed."—EDITOR.

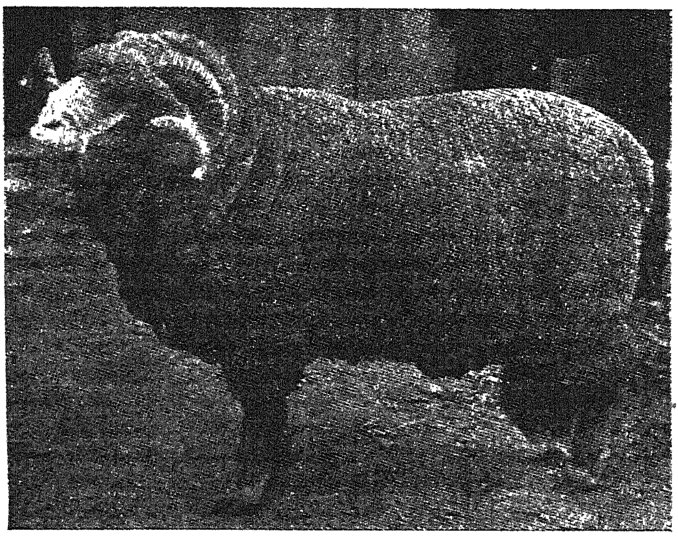
Mohair Deterioration.

At a recent meeting of the Port Elizabeth Chamber of Commerce, the Chairman introduced Mr. Charles Lee, M.L.A., who he said had a matter to bring before them of great interest to produce people. Mr. Lee would briefly explain the object of his desire to meet the produce buyers and the Chamber at a later day in the week.

Mr. Lee, M.L.A., who, upon rising, had a cordial reception, said he was pleased to meet the Chamber on that occasion, particularly as his subject was a matter of some interest to the community, for it was the merchants of Port Elizabeth who had first made the importation of the Angora possible in this country, and he not unnaturally thought that they would be interested in the animals which they had themselves imported into the country. Recent advices from Bradford contained the information that the mohair exported from this country was falling off in character, and could now only be used for the manufacture of coarser material than they had been accustomed to use it for. The manufacturers held the opinion that the Angora hair was not nearly as good as that grown five years ago, and he was afraid that their judgment was correct. What they were interested now in was in what way they could bring it back. The general interest of the country demanded this should be done. The farmers should realise the present condition of their mohair, and the place it now occupied on the Home markets. The report was conflicting, and what was now wanted was an authoritative opinion. He had had some kids shorn on his farm, under his own personal supervision, and had brought samples of the shearing, classified under three heads. The first was the quality satisfactory to

Bradford; the second was an ordinary clip of his flock; and the third showed the want of a higher class of animal for the purpose. He asked them in the interests of the farming community to forward these samples and any other they may receive from Bradford, and get to know exactly what is required to secure the return of the South African grown mohair to the place it used to occupy on the English market. Mr. Hollings generally condemns recent shipments, although he acknowledges there were a few clips that satisfied requirements. He was sure that it was not the climate or the pasturage that was at fault. When he was in town brokers frequently said the mohair was not what it ought to be. It had fallen off in character, and he urged upon them to adopt such measures as would ensure the farmers really getting to know what Bradford manufacturers really require.—*Grahamstown Journal.*

American Merinos in Australia.



AMERICAN MERINO RAM.

On the controversy which has been going on for a long time relative to the introduction of Vermont sheep into Australia, an Australian farmer writes to the *American Sheep Breeder* :—

"There has been a great deal of correspondence in our pastoral papers lately for and against the introduction of your sheep into the flocks of these colonies. Wool buyers and the more conservative of our breeders are united in their opposition to the American merino.

The Australian merino has ever been famous for the fineness of the fibre of its wool, and the opponents of your sheep urge that its introduction into our flocks causes a serious deterioration in this quality. Amongst the numerous arguments used by the opposition the principal seems to be the tendency of the rams to carry a large amount of strong wool and in some instances even hair and jar.

Latterly the question has also arisen as to the pelts of American-bred sheep showing many wrinkles and folds in the skin, and thus depreciating their value from the tanner's point of view as compared with Australian merino pelts. This objection is, of course, only a minor one, since the value of the pelt is only about 18 cents per dozen and can be placed as a by-product when compared with the wool and mutton.

When the whole question is gone into it seems, however, that the American merino has come to stay in Australia, if only for the reason that our growers by using your rams can, in the course of two or three years, put 1½ to 2 lb. weight on the average cut per sheep of their flocks, and when a grower can do this it takes a lot to make him change his line of breeding. With us, as with your growers, the return per head is the first consideration of a sheep man, and when he can see the extra dollars in front he takes the short cut for them.

The supporters of your merinos do not by any means admit that the introduction of this strain will deteriorate the wool of a flock, and say that the strength of the fibre is only an indication of the virility of the ram and stamps his selection as a sire."

Weight of Fleeces.

What may be about the proper average weight of a fleece of wool, considering not only the value of the wool, but also the health of the sheep, is a most interesting enquiry. A sheep farmer says:—"I have been much interested in all the correspondence about dense yolky and heavily clad sheep. For my own part I consider an average of 7½ to 8 lb. per fleece from the general flock is the outside limit a farmer should go for, that is, under the present conditions of farming. Anything beyond that is gained at the expense of the carcase and constitution. Not only that, but these very dense and yolky sheep never seem to grow a good fleece under natural conditions. I should like to see this matter well threshed out."

We shall be pleased to get any opinions and experiences on this interesting subject.—EDITOR.

ENTOMOLOGY.

Locust Extermination.

The following is a translation of a report on the above subject by Mr. Julio Künckel d'Herculais to the Argentine Republican Government and published in the *Memoria de los Trabajos Ejecutados durante los Ejercicios, 1900* :—

REPORT OF MR. JULIO KÜNCKEL D'HERCULAIS, REPLYING TO THE NOTE OF 3RD FEBRUARY, 1899 :—

Buenos Aires, February 27, 1899.

To the President of the Central Committee for the Extinction of Locusts—Dr. Carlos Salas.

In reply to your note dated February 3rd, which you have done me the honour of addressing to me, I have the pleasure to convey to you the information asked for, but first deem it necessary to offer some explanations.

On my return from Algeria in April, 1896, I received in the Museum of Natural History in Paris a visit from Dr. A. Pinero, who had been sent on a mission by the Argentine Government. Dr. Pinero introduced himself to me as representing the Pasteur Institute, and I placed before him all the particulars he required regarding the campaigns in Africa under my direction. At his request I sent him various copies of my publications, which he forwarded to the Argentine Government. I also had various interviews with Mr. Julio Puyrredon, the then President of the Rural Society, to whom I also sent copies of my works.

At that time it was not contemplated that I should be called to the Argentine Republic, and I gave the information requested with the sole intention that it might be useful to the Argentine authorities, with the view that they should put in force the methods which had been recognized as absolutely efficacious against the invasions in Algeria from 1888 to 1893, and later in 1895-1896.

It was only after my works became known to the Argentine Government that they thought of obtaining my co-operation, and requested the French Government that my services should be placed at their disposal. After the correspondence between the Minister representing the Argentine Government in Paris, Dr. Miguel Cane, and the Minister for Foreign Affairs (M. Hanotaux), and after the French Government had explained the written proposals of the Argentine Government, I was authorized to sign the agreement.

I believe that Dr. Belaustigin, Ex-Minister of Public Education, or Dr. Frers, the Minister of Agriculture, had made you acquainted with this agreement. But, if such was not the case, permit me to furnish you with a copy of the essential paragraph in the agreement :—

"Monsieur d'Herculais shall direct the work undertaken with the object of preventing and destroying locusts and other insects, according to Act of 7th August, 1897. To this effect, the Government will render him all assistance to establish and maintain his authority."

On my arrival at Buenos Aires, where I was received by the Authorities and leading Argentine people, I communicated with the Central Committee for the Extinction of Locusts, and presented my publications to Mr. Faustino Alsino, at that time president of the Committee, as also to Mr. Adolfo Puyrredon, vice-president.

From the interviews which I had with the Committee, and from the printed instructions which they handed to me, I became assured that they had already put into practice nearly all the methods described in my works for the destruction of locusts (except the use of apparatus, the first idea of which was derived from North America, and which is called here "Carcarana,"* an apparatus which the character of the soil of Algeria did not permit me to use). Nothing was left me but to approve of what they were doing, and when the Committee submitted for my examination the instructions they had issued, I could do no more than make certain observations regarding details, and propose sundry modifications of a secondary nature, with a view to condensing the text. The Entomological Session convened by Law No. 3490 made me dependent upon the National Office of Agriculture. I immediately occupied myself with the organization of my service, and when this was completed I began to study the South American locust.

It was generally believed that this was the migratory locust, similar to that of Algeria, and it became necessary, in the first place, to clear up this point in Natural History. I soon became convinced that they belong to a distinct species, but the specific differences do not imply conditions of existence absolutely different. Both belonging to the same genus, it followed that the methods for the destruction of migratory locusts applied in Algeria, and recognized as good and effective, would naturally be applied to arrest the devastation of the **Schistocerca paranensis,* Burn. But if the methods employed in Algeria have given good results, it is because they are applied under certain conditions, and in accordance with the means of action at their disposal. It was therefore of importance to know if the physical and administrative conditions of the Argentine Republic (very different from those of other countries) would allow of my adopting the same methods. Therefore I considered it advisable to study the conditions of the country, and that it was positively necessary to travel through it before formulating an opinion.

My first journey was to the province of Santa Fé, in the month of June last, when I had the satisfaction of finding that the columns of locusts were not so numerous as they were supposed to be, and I gave it as my opinion from the beginning, judging from my

* The machine is an oil-smeared sheet iron pan designed to be dragged over the ground.

previous experiences, that the invasion of 1898-1899 would not be so extensive as that of the preceding year, which opinion was subsequently confirmed. On my return from the province of Santa Fé I resumed my interrupted work in the laboratory. The locusts which I brought with me, and those sent to me by the Committee, enabled me to study, firstly, the conditions of birth, and secondly, the causes of death. I ascertained that these insects withstood cold and changes of temperature, being subject to the general laws governing the birth of animals, and in the second place that locusts died from the same essentially physiological reasons: that they did not succumb to any attacks of illness, or of animal or vegetable parasites. From these observations a practical conclusion is arrived at, which is that those locusts which survive the winter are exempt from the natural causes of destruction. It therefore becomes of the first importance to exterminate those columns which would otherwise perpetuate reproduction.

The second journey undertaken was for the special object of ascertaining the possible importance of the invasion in the North-Eastern Provinces of the Agricultural Republic, and particularly to find out what would be the possible importance of the columns pointed out in the north of the province of Corrientes. To ascertain their number and importance, it appeared to me essential to travel along the whole line of invasion, so as to find the columns descending. Following the line from Mercedes to Corrientes, stopping at the principal points, appeared to me the natural route for investigation, reserving the itinerary modifications according to the notes made in the course of the journey.

After touching at Concordia, and placing myself in communication with Inspector Mazza, I ascertained definitely, from the information he had collected, that there were not any columns within the limits of the province of Corrientes, except in the district of Feliciano, 150 kilometres from Concordia. Feeling sure that it was impossible for me to reach the invaded territory in time to be of any use, I resolved to proceed to Monte Caseros and Mercedes, with the idea that we would find that column on the road, if it came further south. In the neighbourhood of Curuzu Cautia (15th September) we found the remains of a column which had left evidence of its passage, the leaves of the trees having been eaten. According to information gathered at Mercedes (17th September), this column was from 3 to 4 kilometres in extent. Locusts were not found in the region of Mercedes, and I hurried on to Corrientes, to obtain as quickly as possible the telegrams received in Buenos Aires announcing the presence of locusts on the borders—from Parana to Itati, and in the Pass of Patria, as already stated in my first report on my arrival (19th September.) I placed myself in communication with the Committee at Corrientes, by whom I was very well received, they lending me every assistance. Telegrams received, as also replies to telegrams sent, made no mention of the presence of locusts in the Upper Parana and vicinity. Not a single locust could be found, and

not even one had remained on the islands of the Parana, which I visited.

I would here mention that on several occasions I have requested the Central Committee to acquaint me of any documents regarding the march of the invasion in the Argentine Republic in previous years, and especially during the 1897-1898 campaign, documents received prior to my arrival in Buenos Aires. Not having received any communications, and left to my own resources, I was obliged to make personal research. It was generally considered that the Chaco was the centre from which the columns which invaded the Argentine Republic emanated. This opinion was so strongly believed as to cause the Agricultural Department to send three expeditions, with the object of studying the locusts in theirpermanent home. Having had the reports presented, communicated to me, I ascertained that the Report of the First Commission does not deal with the question of locusts, while that of the Second Commission merely states: "On the edge of the Campo del Cielo, 8 or 10 leagues to the south of the point named Las Chunas, in a tract 6 leagues in length and 1½ wide, I found unmistakable signs of spawn, but was unable to ascertain precisely when they were there."

And further on it states: "According to legend, there is in the Campo del Cielo an unlimited desolate plain, without trees, of a much higher altitude than the rest of the Chaco, and the question is asked, Is the centre of permanent production to be found there? The Chief Engineer, Mr. Ricardo J. Huergo, already knows my opinion respecting the same."

I have not been informed of the purport of the Report of the Third Commission. I have been able to interrogate only one member of that Committee, who informed me that they found flying locusts during the month of October and early in November, 1897, between Metau and Rivadavia, and that between Rivadavia and Formosa jumping locusts already existed, and that towards the end of December flying locusts were also found in Formosa.

This information did not assist me much in forming an accurate opinion, and I therefore thought it necessary to obtain as much information as possible from persons whose occupation or duty detained them in the Chaco.

Thanks to the kindness of the Governor of the province of Corrientes, I was enabled to place myself in communication with the Governor of the Chaco, who, during a long interview, gave me his ideas on the subject. According to him, the locusts did not originate in the Chaco, but came from the regions further North. I thought it would be of interest to know the habits and movements of the locusts in the more Northern regions of the Chaco, and it appeared to me necessary to find means of becoming acquainted with any observations that might have been made in the district of Formosa.

I had several interviews with people who had resided in the territory for a long time, people who came to see me on board, and they confirmed the statement of the Governor of the Chaco: "the

locusts were normally and always migratory, and came from regions situated further North."

I resolved to avail myself of the letters of introduction given to me by the Governor of Corrientes, while I was ascending the river Parana, so as to acquaint myself of the movements of the locusts in Paraguayan Chaco. It was solely through the Paraguayan authorities, and principally through the Commission for the Extinction of Locusts which existed in that country, that I could gather information. According to them, the flying locusts which had invaded Paraguay during the past few years always came from the West or North-West, that is to say from the territories of Formosa and the Paraguayan Chaco, from whence they took a direction towards the South of Paraguay. On my return, I had equal opportunities of completing my researches, having had the good fortune of meeting Colonel Uriburu, the Governor of Formosa, as also the Sub-Prefect of the same; and from the extensive conversations I had with them, I arrived at the conclusion that the locusts which came from the North-North-West invaded the territory of Formosa, as they later on invaded the provinces more to the South. This oblique march indicates how the locusts invaded the province of Corrientes, but seldom reached the district of Misiones, situated more to the East, due to the fact of their having gone much lower down, and their South-Easterly direction took them into the Republic of Uruguay. If at the beginning of this Report I mentioned the terms of the contract binding me to the Argentine Government, it was with the intention of making it evident that I should at least have the direction of the scientific study of the locust; it was therefore very natural that I should apply myself to the study of the movements of the *Acridium paranense*, the more so that according to documents I had collected in Europe, the insect had previously invaded Colombia, Venezuela, and also Guatamala; therefore some journeys have been made in a Northerly direction, as in these later years were made towards the South.

I felt the greatest interest in ascertaining the area of the geographical extent of this species, because the old naturalists, not knowing their great travelling powers, believed they saw in each region a different species, whereas more modern naturalists believed that there was only one species extending over the whole world, but having their origin in America.

To complete my researches, I asked leave to proceed to the North-West of the Argentine Republic, but have not received any reply to my application.

At the time that I was applying myself to these first studies, I received a telegram calling me to Santa Fé. As soon as it was possible for me to descend the Parana in the only steamer at that time on the river (port of Corrientes), I immediately requested instructions from the Central Commission, sending telegrams from Corrientes, La Paz, Parana and Santa Fé, and it was only through not receiving any reply to these that I decided to return to Buenos Aires.

In the arable lands of the Parana, in the neighbourhood of Santa Fé (San Tome, San Augustin), I was present at the spawning of the locusts, and collected numerous specimens, and it appeared to me important to resume those studies, which could not be followed on the land, and which required my presence in the laboratory.

I had to take in hand a series of experiments regarding the resistance of the eggs to exterior agencies, especially their resistance to the action of water, to ascertain definitely the action which provides the frothy substance which protects the eggs, and above all, to study those parasites which would attack the latter. These researches were not without result. I have been able from the very first to definitely ascertain the impossibility of submerging the eggs or the frothy substance, and that neither of these can be made wet even after a prolonged immersion, which explains the resistance of the eggs to changes of temperature; and at the same time, I discovered that the frothy substance which surrounds and covers the eggs is absolutely proof against putrefaction.

Secondly.—Thanks to the numerous parcels of eggs sent to me by the Central Commission, I have been able to ascertain definitely the effects produced by the various parasites. I have recently been able to determine the part performed by the "champi."* It is known that the "champis" are considered to be great destructors of locusts' eggs. By means of observations and experiments made simultaneously before my own eyes in my office in Buenos Aires, and in the experiment site at Palermo, it has been proved that the "champi," like all the coleoptera belonging to the genus *Trox*, live on organic materials, more or less altered, and not on living materials. The "champi" only attacked dead locusts abandoned on the ground, and the frothy material which covered the spawning holes.

In Palermo, as in Buenos Aires, notwithstanding the disturbance caused by the "champi" in earth full of spawn, a certain number of young locusts were born (Palermo 25 per cent.), and in earth laid alternately with eggs (Buenos Aires 5 per cent.). In consequence of the habit of the "champi" to bury itself in the earth during the day, and to come out at night, it allowed the eggs to come to the surface, when they either became dried up or rotted.

A decisive experiment was made in Palermo—a dead fowl was put into the cage containing the champis and locust spawn, and the champis left only the fowl's feathers and bones; but the eggs were not attacked. It is more than probable that the beneficial action attributed to the champi is due to other animals; as an instance, I have received from different localities, through the Central Commission, some eggs enclosed in tin boxes, which arrived in good condition, and after being carefully kept, either in the tin box or in the earth, soon showed signs of decomposition, and on examination were seen to be covered with mites (*Gamasidæ*), which sucked the substance of the eggs. The multiplication of these mites is most

* The "champi" is a ground beetle much like the common dung-rollers.

rapid, and very soon the eggs were to be seen covered with these insects of all ages. These mites, which up to the present, as far as I am aware, had not been observed, have been a considerable factor in the destruction of the eggs.

The eggs were also attacked by the larva of a small fly (*Anthomyia*), which has also rendered good service in destroying the eggs, especially in the province of Sante Fé, but not to the extent of that rendered by the *Gamasidæ*. This *Anthomyia* attacks the eggs of the *Schistocerca paranensis* under the same conditions as one of the same genus which devours the eggs of the *Schistocerca peregrina*. I would mention, in passing, that the larva of this fly has no relation whatever with that of the common fly, as was supposed by an eminent Argentine naturalist. I have not been able to observe, as I had hoped to, the larvæ of certain flies which in Algeria in a few days destroy the spawn over an area of several hectares. The observations which I have been able to make on the larvæ of those flies which live in the bodies of the locusts have, up to the present, been of secondary interest. Having had many opportunities for observing the "Sarcophaga," which attacks the *Acridium paranense*, it acts absolutely the same as others of its kind. At the same time, I have been able to make an observation not lacking in interest. The "Sarcophaga," which extends over the whole of the Argentine Republic, viviparous, as are all the species of its genus, settles upon the body of the various species of grasshoppers (Tucuras)* which abound in all parts, and the larva penetrates the body of the insect, which maintains it. The "Tucuras" are, to a certain extent, charged with the conservation of the species, and when the migratory locusts invade the country, this fly finds a ready means of securing its rapid multiplication. It is said that in these later years in all countries it is endeavoured to artificially introduce those parasites, animal or vegetable, for the destruction of noxious insects. In Algeria, as here, this question had my attention, and in all my investigations I always adopted the method of patient observation. For this reason I hurried to determine the conditions under which contamination was possible, as also that it could be known beforehand how to operate to secure the issue of the experiments to be made. With this idea, I made a series of studies, of which the following are the general conclusions arrived at. Directing attention to the action effected by the pigments in the phenomena of histolysis and of histogeny† which accompany the metamorphoses of the migratory locusts, I ascertained that after every change, these locusts threw off, together with the cast-off skins, the pigment which gave them their reddish colour. Following on the development of the "Parana locust," I examined, after the metamorphosis, the first cast-off skins, which I saw were charged, like those

* "Tucura" is the Argentine term for a non-migratory locust.

† "Histolysis" and "histogeny" denote respectively the breaking down and the building up of the animal tissues.

of the African species, with reddish granulated pigments, but on this occasion the microscope revealed that they were in reality a species of bags, constituted by the intestinal cuticle. These bags immersed in water, as soon as ejected, presented most interesting particulars. They soon became swollen with great inflations of air, which was merely the remains of the air borne in the digestive tubes to admit of the metamorphosis; thus, as I have demonstrated in my previous studies, the more the granulations resulting from the histolysis of the tissues, and the granulations of red pigments, the more numerous were the *Gregarinæ** perceived.

Thus those *Protozoa* were ejected as residuum for the same reasons as the products of the histolysis. It is thus conceivable that each change determines not only the regeneration of the normal tissues, but also the freeing of the system of those parasites which cause the destruction of those tissues.

If it is desired to record the experiments made by me in Algeria to attempt to infect direct the young jumping locusts by means of germs of fungus discovered by me on the full-grown locusts, the *Lachnidium acridiorum*, Giard, experiences by means of which I have ascertained that the repeated changes of these insects are opposed to the fixing of germs on the skins; if it is remembered that the stigmatic openings frequently serve as the means of the germs penetrating, and that the germs having germinated, the ramifications of the dense mycelium obstruct the breathing tubes, producing symptoms of asphyxia as seen by Professor A. Giard, it is obligatory to know that the expulsion with the skin of the internal lining of the breathing tubes is a serious obstacle to the conservation of the germs in the surroundings necessary for their germination. These observations show that insects of rapid development, such as the migratory locusts of the Old as well as of the New World, have in their power a very simple means of getting rid of parasitical organisms in such a manner that they become regenerated in each stage of their evolution. Thus can be understood the resistance which in normal conditions of life the insects can offer against contamination, or the disorganizing action of certain parasites either vegetable or animal.

These are briefly the results of these first researches regarding parasites, of which, together with biographical notes, a précis will be published in the annals of the Argentine Scientific Society, as it is necessary to safeguard my proprietary rights. I have also prosecuted a series of biological investigations on locusts in the experimental camp at Palermo, under the care of Mr. Colavecchia, assistant in this section, with the assistance of Mr. Venturi, also assistant in the section. I have particularly charged Mr. Venturi with investigations regarding the management of birds. These latter works will enable me to reply, with the assistance of docu-

* "*Gregarinæ* are low forms of parasitic organisms not uncommon in the intestines of insects.

ments, to the question put by Mr. Enrique Croppi, which the Central Commission has submitted to me, and which refers to the advantages accruing from the introduction into the country of exotic insectivorous birds. At present, I may say that this introduction appears to me problematical.

I may add that all the work effected in the entomological section, the study of both jumping and flying locusts of any interest, also the parasites which attack the locusts in all stages, are carefully reproduced by Mr. Stalleng, colour artist of the section. These drawings will enable me to complete, to better advantage, the publication which I am preparing, which will give the complete results of my study of the Parana locust.

I desire the President to accept the expression of my most distinguished sentiments.

(Signed) JULIO KÜNCKEL D'HERCULAIS.

Buenos Aires, February 27th, 1899.

March 17th, 1899.

Presented to the Inspector-General for report,

(Signed) GRAMAJO.

(To be continued.)

Scale on South African Fruit.

Under the above heading, the following appeared as the leading editorial in the *California Fruit Grower* for March 9th :—

"A well known fruit handler of London, England, in a communication which was recently printed in a New York trade journal, says among other things: 'The Cape, South Africa, fruit season has started but as yet supplies are not heavy. Some good apricots and a few peaches have come forward which as curiosities have sold at fancy prices. There were also some 50 or 60 packages of plums, three boxes in each package, each plum being wrapped in paper, Californian style. These plums were the Kelsey Japan, also, I suppose, from California. I am sorry to see the scale on some of the fruit as the trees must be very young, and unless cleaned at once they will be valueless in a year or two.'

"The fruit industry of South Africa, commercially considered, is but at the beginning of its career. The nursery stock used in the Cape orchards is largely Californian, or is the descendant of Californian trees of improved sorts and varieties. In many instances the largest orchards and those owned by the most progressive men in South Africa have experienced Californians either as superintendents or as managers. Californian methods of packing and shipping fruit are closely followed. And yet scale is detected on some of the exported fruit! One would have supposed that Californian methods

of checking the scale, of bridling *Aspidiotus perniciosus* and its many relatives would also have been imported by the Cape orchardist. But it seems not, and thus early scale is found on South African fruit in a London market.

"While the Californians who are in charge of the orchards in that part of the world may be depended upon to do all that is possible to suppress the scale, *California Fruit Grower* is forced to the conclusion that the outlook there is not as bright as it should be."

Thus are our misdeeds noised abroad in the world! It is not known what kind of scale was found on the fruit, nor is it clear which of the fruits—plums, peaches, or apricots—was infested. As the San Jose Scale, *Aspidiotus perniciosus,* is not known to occur in the Colony, it is unlikely to have been that species. Very likely it was the White Peach Scale, *Diaspis pentagona* (*amygdali*), a species well known to our fruit growers. Whatever scale it was, however, the lesson is the same; and our packers should in future exercise still greater care in the selection of their fruit for export if they care to see their industry flourish. Diseased and insect infested fruit of any and all kinds, mealy bug affected grapes included, should be absolutely excluded from packages going abroad or we will find the foreign demands for our fruit remaining limited and the returns to be meagre. The sales of American fruit in several continental countries have of recent years been seriously hampered by restrictions imposed because of the occasional finding of scale insects on such products, and we cannot expect other treatment for our fruit if it, too, is open to the suspicion of harbouring pests.

C.P.L.

HORTICULTURE.

Meeting of Board of Horticulture, Western Province.

A special meeting of the Western Province Board of Horticulture was held in the Civil Commissioner's offices, Stellenbosch, on the 26th April. Mr. C. Köhler was elected to the chair, and the members present were: Messrs. W. van der Byl, P. J. Cillie, P. J. le Roux, C. Mayer, and by special request Mr. C. Neethling.

After the minutes of the previous meeting had been read and confirmed, the Chairman expressed some doubts as to this meeting being entitled to consider any business except the one for which the meeting had been called. It was, however, resolved to proceed with other business as well, but make all resolutions passed subject to confirmation by the next meeting.

Pulped Fruit.

A letter was read from the Department of Agriculture conveying copies of letters received by the Agent-General from various firms in response to enquiries as to the sale of fruit pulp in England.

It was resolved that this matter be again brought up for discussion at the next meeting.

Railway Matters.

A letter was read from the General Manager of Railways explaining that to his great regret it had been impossible to supply the promised additional assistance at the various stations during the past season on account of the need for meeting military requirements.

Annual Fruit-growers' Congress.

After some discussion it was resolved that, in view of the existence of plague and Martial Law in certain districts making it doubtful whether a representative meeting would be brought together, the Annual Fruit-growers' Congress be postponed.

Chairmanship.

A letter was read from Sir Pieter Faure regretting his inability of accepting the chairmanship, and stating that in his opinion the Department of Agriculture was already sufficiently represented by its nominees, Messrs. Lounsbury and Mayer.

Resolved that the chairman of this meeting act as chairman until the next meeting, and that then a chairman be elected.

Handbook of Varieties of Fruits.

Mr. P. J. Cillie, C. son, brought up his report in reference to the enquiries made by him, upon request of the Board of Horticulture, into the suitability of the different kinds of fruit trees, and stated that at their next meeting he would be able to submit a list of trees he could recommend and a list of trees he had to condemn.

A considerable discussion followed the reading of the report. It was universally held that many sorts planted years ago and still offered for sale, were unsuitable, and after agreeing that Mr. Cillie's report be published in the *Agricultural Journal* and that the matter be again discussed at their next meeting, it was resolved: That the attention of the Department of Agriculture be drawn to Mr. Cillie's report and recommendations therein, more particularly to the part emphasising the heavy losses sustained by growers through purchasing and planting varieties of fruit trees proved to be totally unsuitable to the conditions of this country, and that the Board entirely endorses the views set forth. Further, that the Department of Agriculture be requested to assist the Board in every way to make a joint searching investigation so as to be able in due time to place before those intending to further embark in fruit-growing such

information as will prevent them from incurring heavy loss; and that the Board is of opinion that, unless the above suggested enquiry is vigorously taken in hand, the fruit-growing industry will receive a crushing blow.

JAPANESE PLUMS.

A letter was read from the Department of Agriculture forwarding reports of Messrs. C. Mayer and E. Pillans as to the best stocks for Japanese plums. After the reports had been read the Acting Secretary was instructed to publish them in the *Agricultural Journal.*

BIRD AND INSECT NETTING.

A letter was read from the Under Secretary for Agriculture submitting Mr. Feltham's application for bird netting and enquiring what the Board was doing to meet applications.

Resolved that the matter stand over for next meeting.

ARTIFICIAL MANURES.

The chairman enquired when the artificial manures ordered through the Board of Horticulture would be delivered. The Acting Secretary stated that he had just received a wire advising him of their arrival.

STOCKS FOR CITRUS TREES.

Mr. Cillie moved that the question of suitable stocks for citrus trees be discussed. In doing so, Mr. Cillie pointed out that, following foreign experience, the Seville orange had recently been principally used for grafting, with the result that in the majority of cases this stock had proved itself unsuitable to this country.

After a very lengthy discussion it was resolved to request the Department of Agriculture to appoint in conjunction with the Board of Horticulture a Commission for the purpose of making a complete and thorough enquiry into the causes of the present failures, and furnish a detailed report on the suitability of the different stocks, growth, health and adaptation of the different sorts to the various parts of the Colony. Further, that Mr. H. Meyers be asked to act as the Board's representative on that Commission.

The Drying and Packing of Apricots in California.

Dried apricots have become an important article of preparation and commerce, and therefore the best methods of its production and packing are matters of consideration. The *Mildura Cultivator* has the following notes on the subject:—

The drying of apricots is an industry which has been followed in Mildura for about eight years, but it is not at all common in other parts of Australia, though the processed fruit is coming more and

more into public favour. The processes adopted here are very much similar to those in vogue in California, but with their go-ahead notions the Americans can still lead a little in the preparation and get-up of the fruit, even though the fruit processed is not up to Mildura's standard. The process there as described in the *Pacific Tree and Vine* is reprinted for the general information and for purposes of comparison by local apricot-driers:—

DRIED IN AMERICA.

Dried apricots are a favourite fruit, and properly prepared they can hardly be distinguished from freshly stewed fruit, and are a splendid material for jams or for pies. Before drying, the fruit is permitted to become fully coloured and as ripe as possible without losing shape, there being a steady increase in weight up to this point. They are assorted as to sizes to make uniform drying. They are cleanly cut and the pit removed, then the halves, flat side up, spread on trays directly from the hand of the cutter. A carload of trays is run into the sulphur house and exposed to the fumes of burning sulphur long enough to thoroughly sterilize the fruit, set the colour, and prevent the attacks of insects. This time varies from one to two hours, depending on the conditions of the fruit and the amount of sulphur burned. Thus treated, no fermentation or decay sets in, and by the time the smell of the sulphur has all escaped into the air the fruit, being placed in the hot sun, is cured enough to keep clean and uniform in a golden yellow colour—or a brick-red colour as the case might be.

Before becoming bone dry the fruit is stacked up on the trays and allowed to slowly cure in the shade for a while. It is then removed from the trays and piled in the fruit house for the so-called sweating process, which is no more nor less than permitting the driest pieces to absorb a little moisture from the others, which in turn become drier and the whole mass soon comes to a uniform condition.

The fruit when thoroughly equalised and cured in the pile is run through the grader, which sorts out the different sizes. All through these operations any discoloured pieces, and they are very rare, are thrown into a box by themselves to make an uniform grade.

In packing, the bottom of the box is removed and one or two layers of fruit carefully placed by hand on what is to be the top of the box and the balance thrown in promiscuously until the required weight is in, when the box is placed under a press and settled down until the cover will go on easily. The boxes are sometimes lined with papers, lead paper at the top to make the fruit attractive when the box are opened.

The apricot has a very clean acid, not very strong, and is regarded as being one of the most healthful fruits that is produced.

To prepare dried apricots, soak in lukewarm or even cold water until well swollen out, and then cook with gentle heat, just coming to boiling heat without vigorous boiling. Sweeten to taste, and eat separately or with custard or pudding or cream.

Return of Fruit Exported during Month of March, 1901.

Variety of Fruit.	No. of Packages.	Quantity Lb.	Number.	Declared Value. £ s. d.
Grapes... ...	3,967	82,852	...	1,746 4 6
Pears	196	...	4,660	81 10 0
Apples... ...	60	...	2,735	26 5 0
Plums	214	...	6,360	22 10 0
Nectarines ...	69	...	2,131	14 14 0
Quinces ...	8	...	800	5 0 0
Dried Fruit ..	1	80	...	3 10 0
Peaches ...	7	...	210	0 14 0
Tomatoes ...	2	20	...	0 10 0
Totals ...	4,530	82,952	16,944	1,902 17 6

DAIRYING.

Report on Dairying Industry for Year 1900.

The following is the report of Mr. Owens, Dairy Assistant, for the year ending December 31st, 1900:—

The year 1900 has indeed been a very severe one for the dairy farmers of this country. During the greater part of the year a large portion of the Eastern Province suffered very severely from drought. This, combined with constant visitations of large swarms of locusts, made the lot of the dairy farmer a rather hard one.

Owing to the long continued drought and the heavy and cold rains at the beginning of December, farmers suffered severe losses of stock, individual farmers losing as many as one hundred head of cattle.

Those farmers who sow summer crops in order to provide winter feeding for their cattle were this year sorely disappointed, as the ravages caused by swarms of locusts made it almost impossible for them to save any of their crops. The consequence has been that dairy herds, that were in the habit of being fed during the winter months, had this year to be turned adrift on the veld, with the result that large numbers of them died, and those remaining were reduced to such miserable condition, that a considerable time must elapse before they reach their normal condition; consequently the dairy products for the year, in the Colony, will be considerably below the average of the last five years.

It is pleasing to be able to report that dairy farmers are taking an increased interest in the ways and means of raising the average production of their dairy herds, and I receive constant inquiries as to where they are most likely to procure suitable sires, with this object in view. In this direction very much depends on the progress the dairy industry is going to make in this country. The present average of the dairy herds of this country are far below what it can be reasonably expected to be, and with judicious selection of sires, and provision made for feeding the cows during the scarce season of the year, I have no hesitation in saying that the average can be raised by fully 100 %. This would mean that a farmer would make as much from fifty cows as he does from one hundred cows at present.

In other dairying countries, where the farmers have already attained a very high average production in their dairy herds, they find it to their advantage to make every effort in order to further raise the average production of the individual cows constituting their herd. How much more necessary must it be for the dairy farmers of this country to make an effort in the same direction, when we come to consider the present low average production of the dairy herds of this country. Farmers sometimes complain that owing to the low prices of dairy produce during the summer season, it is not very encouraging to pay high prices for stud animals in order to improve their herds. The low prices which rule for dairy produce at certain seasons of the year are due chiefly to competition from other countries, and this competition is not only going to continue, but is being pushed rigorously by the different countries interested.

It is therefore important that the dairy farmers of this country should make an increased effort in adopting up-to-date methods in all branches of dairying in order to be able to compete with the increased competition from other countries in the markets of this Colony.

I have pointed out in previous reports the rather slipshod manner in which the dairy herds in this country are managed generally. In no other dairying country in the world are the calves allowed to run with their mothers, the practice generally adopted in this country.

Some farmers are under the impression that if the calves are weaned, the cow will immediately dry up. This may be the case with cows that have previously reared calves, but in the case of

heifers with their first calf, if the calf is at once removed and the cow milked thoroughly dry twice daily, no trouble will be experienced and the cow will be more contented, and the results more satisfactory in every way.

In hand-rearing the calves it is necessary for the first three weeks to feed on full milk, gradually substituting skim milk, taking about fourteen days to complete the process. At the same time it will be found beneficial to give a little mealie meal to each calf, thereby replacing some of the food constituents removed in the process of separating. There may be a little trouble experienced the first day or two in teaching the calf to drink, but as a rule, after the first meal or two, the calf usually takes readily to the milk offered. It is very necessary to feed calves at regular intervals, giving uniform quantity, at an even temperature. If these simple rules are followed, no trouble will be found in rearing as well-grown calves as is done in the usual way adopted in this country of allowing the calves to run with their mothers. Some few farmers have adopted the system of hand-rearing their calves, and the greatest difficulty they experienced at the beginning was with their servants; but with a little close attention the difficulty was rapidly overcome and the change has proved highly satisfactory, and more profitable than the old method.

The cheese-making portion of the industry has not made so much progress during the year as could be desired. The causes chiefly are those mentioned at the beginning of this report, combined with the unsettled state of portions of the Eastern Province of the Colony, as those who had not previously purchased the necessary appliances could not see their way clear to make the necessary outlay until a more peaceful time had arrived. During the year I paid a visit for the first time to the territory of East Griqualand, and I was very much impressed with the possible resources of that part in the way of producing large quantities of dairy produce, the great obstacle to development at present being the absence of railway communication for conveying the produce to suitable markets.

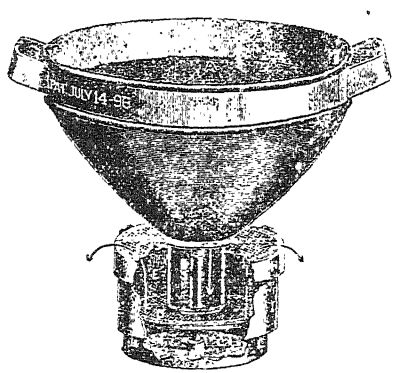
The territory seems to be more favoured in the way of rainfall than most of the districts of the Colony proper, and I was informed by the different farmers visited that drought in anything of a severe nature is practically unknown, and that it is possible to grow large quantities of green fodder for feeding purposes without the aid of irrigation. Several farmers in the territory were engaged in making cheese, for which they were able to obtain ready sale at remunerative prices.

There was an agricultural show held in Kokstad during my visit, at which I was requested to judge the dairy produce. The show, when considered to be quite a local effort, was a complete success. Some fine specimens of shorthorn and Hereford cattle were exhibited, and would compare very favourably with those exhibited at the more important shows held throughout the Colony.

During the year my movements have been very much hampered owing to the invasion of several districts in the North of the Colony

by the forces of the adjoining States. Numerous farmers who were engaged in dairying in the above districts paid very little attention to the products of their dairy owing to the unrest existing. The farmers are anxiously looking forward to the time when peace will be restored and they will be able to follow their different farming pursuits unhampered.

Straining Impurities from Milk.



PATENT MILK STRAINER.

Of this invention and its operation we find with the above illustration this description in the American *Country Gentleman* :—

"The apparatus consists of a reservoir, *A* ; a cylindrical discharge pipe, *B* ; a settling chamber, *C* ; a retaining gauze, *D* ; container, *E* ; a fine strainer gauze, *F*. The milk is emptied into the reservoir *A*, flows through channel *B* into chamber *C*, where the heavy sediment and other objectionable matter settle. The up-flowing current of milk is strained by *B*, and re-strained again at *F*, while the thoroughly purified milk overflows the top of the cage *H* into the can or pail. When through straining, the small quantity of milk remaining in *E* can be poured over *H* into the pail or can.

The cut will show clearly the arrangement of the strainer, and we have the endorsement of the most thoroughly practical milkmen to the effect that it is 'the best and only practical and thorough milk strainer and purifier ever put on the market, and completely removes all sediment from the milk.'

The reservoir *A* is made of heavy four cross tin. The malleable iron outer cage *I* is securely clamped to the flange *H* by a centre bolt, fastened to the bottom of *C* and to reservoir *A*, and is held in position by a yoke and thumb nut inside the bottom of *A*. The price is $2.50 (10s. 5d.)."

The purification of milk is most important. Of course, it is better not to let dirt get into the milk in the first place, but as this is often almost impossible, a thorough straining and purifying is the best thing to be done. This strainer appears to be an effective one and first cost not much money.—EDITOR.

MISCELLANEOUS.

Destruction of Prickly Pear.

The people of Queensland and New South Wales who are afflicted with prickly pear on their properties are now adopting a system of poisoning the plant, which, it is thought, will be effective and fairly economical. Another method of dealing with this pest is related in *La Belgique Coloniale*. In Colombia, South America, it has been for a long time thought that the opuntia, or prickly pear, is incombustible. The origin of this mistake, that is made by many, lies in the fact that, after being subjected to the flames, the plant appears to have preserved its vitality, and it remains standing. The explanation is easy; the flame enwraps the plant, and leaves it apparently intact, but the heat affects the tissues, especially of its younger parts, termentation is set up, then decomposition, and the death of the plant. The writer of the article says, in his opinion, the only means of economically eradicating the prickly pear is by fire, and this is the method most usually adopted in Colombia. Isolated specimens are easily destroyed by piling round them some dried plants, and setting fire to these. But for large clumps the following plan should be pursued:—In the rainy season plant round the clumps bushy ilanas or creepers, having a dense foliage, dolichos,* for example; these lianas, planted in such quantities that they entirely cover the prickly pears, are cut down in summer time, and burnt when dried. This causes most of the pears to be destroyed, and the operation is repeated when the succeeding rains have caused the lianas to grow again. Afterwards the ground can be used for pasturage, and, if some shoots of the weed have partly escaped the fire, and grown again, they are easily removed by burning them a third time, using the same dolichos, which will again grow over them. If the grounds are to be made into meadow land—and for this such fields are well suited—it is

* For this Colony, nothing could be better than the quick and vigorous *Dolichos gibbosus*, Thunb., common from Cape Town to Natal. It also makes a charming, dense, evergreen covering for arbours and arches, with its pink or purple blossoms.—W.T.

advisable, after the first firing, to sow the spaces free from pear with *Panicum altissimum*, which in pear-lands is the grass which grows best, and forms, at but small expense, meadow land excellent in quality and easily maintained.—*Australasian.*

The *Queenslander* mentions that experiments in the destruction of prickly pear at the Westbrook State farm are proceeding satisfactorily. Mr. P. M'Lean, the agricultural adviser, during his recent visit to Westbrook, arranged for the complete spraying of the pest, as it is now in fruit. He hopes by this means to kill off all the fruit before it goes to seed. Mr. M'Lean's experience is that the experiments can only be a success where the plant has been thoroughly sprayed all over.

Pyrethrum Culture and Yield.

Our correspondent to whom we are indebted for notes on the satisfactory growth of this plant and use of the insect powder derived from it, in reply to our enquiry in No. 6 of this volume of the *Journal*, writes :—

"There is nothing special to report on the cultivation of Pyrethrum. I find that the seeds come up best if sown in the rainy season towards Autumn; it still counts as a year in the growth of the plant. A dozen plants well cared for will give about 2 lb. of powder each season."

We lately had an enquiry for seed which we obtained from Messrs. Gowie, Grahamstown, who keep a supply in stock. It ought to be sown all over the country. A small bed in the garden would furnish a supply of powder to keep down insect pests indoors and out.—EDITOR.

Spiced Poultry Food.

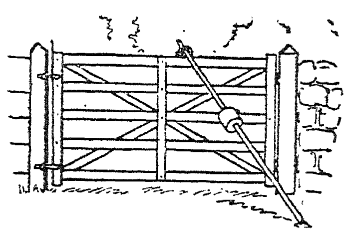
One of the fallacies of the day is that the production of eggs can be increased by the use of highly spiced stimulating foods. These are consequently advertised by the makers very extensively. The slightest acquaintance with anatomy and physiology would prove the absurdity of such a belief. Animals cannot be made more fertile by giving them unnatural diet, and irritating their digestive organs with food which they do not obtain in a natural state. Some of these substances which are sold as egg producers are fiery and stimulating to the highest degree, and cannot possibly tend to

increase egg production. No flock master or stock breeder would imagine that he was increasing the fertility of his sheep or cows by giving them highly spiced diet, but fanciers seem inclined to believe in any statement that is reiterated a sufficient number of times. I have recently received several complaints of the ill-health of birds that had been fed on spiced foods. If the natural diet of a fowl is taken into consideration, it will be found that the bird never takes voluntarily any substance of the kind. The production of eggs in quantity requires that the fowls shall be provided with the materials out of which they can be secreted or made, and certainly turmeric and cheap waste peppers do not furnish these substances.

A very convincing proof of the materials out of which eggs are made may be seen in fields adjoining poultry yards when a warm spring rain comes on towards the close of the day. An attentive observer may then notice that several of the hens, in place of going early to roost with the others, wander about the fields, dragging out of the ground the lob worms that have been attracted to the surface by the rain, whereas the other birds that are not laying are not so anxious after nitrogenous food. The great advantage of having poultry houses open, where the absence of foxes permits of such an arrangement, is that the hens can go out in the very early morning before the lob worms have retired into the ground. This they always do if allowed at liberty; hence, fowls which have a free range cost about one-half as much to keep as those which are shut up in enclosed runs; moreover, obtaining natural animal and vegetable food, they are much more healthy and prolific than those penned up in confined runs such as those employed by the ordinary poultry farmer.

W. B. TEGETMEIER, in *Field.*

A Self-Closing Gate.



Our sketch (taken from the *Scientific American*) shows a self-closing gate that has been recently patented in the United States. On the top bar of the gate a roller is journalled which is engaged by an inclined rod fulcrumed at its lower end on a fixed support set at a

proper distance from the hinge-post. A weight is held on the rod and can be fastened in any desired position by means of a set screw. To prevent the rod from leaving the roller when opening and closing the gate, the bracket in which the roller is journalled is provided with a loop. When the gate is swung open, the free end of the rod travels over the friction-roller and assumes nearly a vertical position. As soon as the gate is released, the weight of the rod pressing against the roller closes the gate. By changing the position of the weight, the gate can be closed with more or less force.

Australasian.

Increased Importation of Tobacco.

In the statement of imports of Farm Produce during the year 1900, on another page, it is shown that there was a large increase in the quantity and value of the tobacco imported. Of the three kinds the total quantity was 1,101 tons, being nearly two and a half times as much as during the year 1899. The total cost of the 1900 import being £308,605, and an increase on the former year of £132,718. The duty paid on one thousand tons of tobacco was a handsome contribution to the colonial revenue, but still the question will arise, Why should we require to import so much and send such large amounts of money out of the country, year after year, though not as large as in 1900, yet in considerable amounts ?—EDITOR.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Fumigation of Citrus Trees.

It is notified for the information of fruit-growers that a fresh consignment of guaranteed 98 per cent. Cyanide of Potassium has been received by the Department of Agriculture and can be obtained, solely for the fumigation of orchard trees, at the rate of 1s. 2d. per lb. when supplied in the case of 2 cwt. or 1s. 3d. per lb. for smaller quantities. Remittance should accompany application. This price does not include railway carriage, which will have to be paid by the recipient. According to arrangement with the Railway Department, Cyanide for the fumigation of orchard trees is conveyed at third class rates. This only applies to quantities of 100 lbs. or over; small lots have to pay ordinary rates.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act. 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned:

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..........................

(Signature)..
(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..

Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of......................................

Place to which Cattle are being sent.....................

(Inspector's signature).......................................

(Address)..

Date...................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices to date, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896, 30th September, 1897, 27th October, 1898, 13th April and 6th July, 1899.

List of Fertilizers.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent.	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town.)				
De Waal & Co., Cape Town.	Jadoo Fibre	0	10	6	per bale of 112 lb.
	Jadoo Liquid	0	2	6	per gallon.
Jas. Flower & Sons, Cape Town.	Economical Bone Fertilizer	8	10	0	per ton of 2,000 lb.
	Bone Meal	8	10	0	,, ,,
	(Prices free on trucks, Cape Town.)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphate	5	5	0	,, ,,
(Containing 26 per cent. Tribasic Phosphate of Lime.)					
	No. 2 Superphosphate	5	15	0	,, ,,
(Containing 30 per cent. Tribasic Phosphate of Lime.)					
	No. 3 Superphosphate	6	7	6	,, ,,
(Containing 37 per cent. Tribasic Phosphate of Lime.)					
	Vine Fertilizer	10	0	0	,, ,,
	(Prices free on trucks, Cape Town.)				
White, Ryan & Co., Cape Town.	Potato Manure	8	10	0	,, ,,
	Grain or Cereal Manure	7	0	0	,, ,,
	Tree and Vine Manure	6	10	0	,, ,,
	Pure Bone Meal	6	10	0	,, ,,
(Prices free on trucks at Woodstock Station.)					
Odam's Manure & Chemical Co., Port Elizabeth. White, Ryan & Co., Cape Town.	Odam's "Complete" Fertilizer	9	0	0	per ton.
	Odam's Vine Fertilizer	8	0	0	,, ,,
	Odam's Vitriolized Bones	8	0	0	,, ,,
	Odam's Cereal Fertilizer	8	10	0	,, ,,
(Prices free on trucks at Cape Town or Port Elizabeth.)					
Woodhead, Plant & Co., Cape Town	Thomas' Phosphate Powder (Basic Slag)	£4	5	0	per ton of 2,000 lb.
	Kainit	5	5	0	,, ,,
	Sulphate of Potash	16	0	0	,, ,,
	Muriate of Potash	16	0	0	,, ,,
	Superphosphates	5	5	0	,, ,,
	Nitrate of Soda	14	10	0	,, ,,
	Sulphate of Ammonia	1	2	6	per 100 lb.
	Vineyard Manure	1	15	0	per 112 lb.
	Tobacco Manure	1	15	0	per 200 lb.
Government Guano:—					
	Ordinary Guano	6	10	0	per ton of 2,000 lb.
	or	0	13	0	per bag of 200 lb.
	Rock Guano	6	17	0	per ton of 2,000 lb.
	or	0	13	9	per bag of 200 lb.

For use within the limits of the Colony.
Price includes delivery at Cape Town Railway Station.

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

Indwe Native Agricultural Society.

The Secretary of this Society has written to say that at a meeting held on the 17th inst., at Indwe, it was decided that holding the show be left over until next season. This was by request of the Natives themselves.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 574.

The second of the series for the year 1901 began on March 12th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured: com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

Mark.	Description & Ship.	Bales.	s.	d.
ALGOA BAY.		March 26.		
	Scot.			
AJB	Grs.sup.com. ..	6	0	5¼
	,, ,, ...	37	0	4¾
	,, ,, ...	27	0	4¼
EAST LONDON.				
	Briton.			
XLNT	..Grs.ext.sup.com.	40 notsold		
GSN	.. ,, ,, ,, ,,	6	0	4¾
OMO	.. ,, ,, ,, ,,	41 notsold		
COS	.. ,, ,, ,, ,,	36 notsold		
	Carisbrook.			
M F G (in triangle)	Grs.ext.sup.com.	63	0	8
	,, ,, ,, ,,	16	0	7½
	,, ,, ,, ,,	17	0	7¼
	,, ,, ,, ,,	4	0	3¼

Mark.	Description & Ship.	Bales.	s.	d.
CAPE.		March 27.		
	Ingeli.			
BM&Co TH	Scd.mix. ...	1	0	5¼
	,, ...	1	0	5½
	,, ...	3	0	6½
	Tintagel.			
CJM KG	Grs.sup.com. ..	8	0	5½
	,, ,, ,, ..	10	0	5¼
	,, ,, ,, ..	3 notsold		
	,, pcs. ..	1	0	4¼
[Paar] SE	..sn.-wt.sup. ..	14	1	3
Waverley Ms M	,, ,, ext. ...	8 notsold		
	,, ,, ,, ...	8	1	2½
	,, ,, ,, ..	19	1	1½
	,, ,, ,, ...	8	1	2
	,, ,, ,, ..	15	1	2

Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
B&SB	Grs.com.	8	0	5½
	,, ,,	31	0	5¼
	,, ,,	20	0	5
	,, ,,	18	0	5¼
	,, ,,	12	0	5
	,, ,,	7	0	5¼
	,, ,,	13	0	5
	,, ,,	10	0	4¾
	,, sup.	15	notsold	
	,, ...	1	0	4¾
	,, dam	3	0	4¾
AS	Grs.com.	12	0	5½
,, JK	,, ,,	11	0	5¼
,, DK	,, ,	20or22	0	5
,, FB	,, ,,	6	notsold	
	,, mix.	1	0	4
,, M	,, com	20	0	5¾
,, FM	, ,,	1	0	5¼
,, JS	,, ,,	8	0	5¼
,, JF	,, ,,	1	0	5
,, DS	,, ,,	3	0	4½
,, SF	,, ,,	16	0	5¼
,, WS	,, ,,	8	notsold	
,, WF	,, ,,	1	0	5
,, FH	,, ,,	1	0	4¼
,, C&C	,, mix.	1	0	4¼

Bundesrath.

Mark.	Description & Ship.	Bales.	s.	d.
XX	Grs.com.	36	0	5¼
	,, ,,	15or16	notsold	
	,, ..	4	0	5
	,, sup.	3	0	4½
	,, dam.	1	0	5¼
D in triangle RL	Grs.com.	8	0	5¼
	,, ,,	9	0	5
	,, ,,	1	0	4½
	,, ,,	2	0	4¾
Star in triangle FS	,, ,,	11or12	0	6
do. OS	,, ,,	3	0	5¾

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
DM	Grs sup.com.	24	0	7¼
	,, lks..	2	0	3¾
V/KR	,, sup.com.	34	0	7
Sidney Jackson	,, 1st ,,	19	0	6¼
	,, clo.	5	0	5½
CJR/Caledon	,, sup.	1	0	5¾

ALGOA BAY.

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
B in triangle	Grs.sup.com.	5	0	5¼

EAST LONDON.

Dunottar, Briton, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
6 birds in reversed triangle	Flc.wsh.sup.	13	0	6¾
EL do.	,, ,, ,,	15	0	6¾
	,, ,, ,,	20	0	6½
	,, ,, ,,	16	0	6¼
,, ,, TM	,, ,, ,,	19	notsold	
Crossed swords	sn.-wt.sup.	16	1	1½
	,, ,,	20	1	0
	,, ..	2	0	9½
EL do.	,, sup.	21	1	0

Kaiser. at Delgoa

Mark.	Description & Ship.	Bales.	s.	d.
Star in triangle WEH	Grs.sup.com.	19	0	6½
	,, ,, ,,	17	0	6¼
	,, mix	1	0	3¼
do. VR	,, com.sup.	12	0	6½
do. HDK	,, ,, ,,	15	0	6¼
	,, ,, ,,	12	0	5½
	,, ,, ,,	23	0	5¼
	,, ,, ,, dam	6	0	5½
do. PF	,, ,, ,,	16	0	5½
do. JVZ	,, ,, ,,	7	0	5¾
do. NS	,, ,, ,,	12	0	5¾
B&SB	,, ,,	14	0	5¼
	,, ,,	1	0	3¼
	mix. ..	12	0	3¼

Canarias. at Delgoa

Mark.	Description & Ship.	Bales.	s.	d.
Star in triangle NS.	Grs.com.	8	0	5¾
	,, ,, ..	3	0	4½
	,, ...	8	notsold	
	,, com.	14	0	5
	,, sup.	3	0	4½
do. HDK	,, com.	7	0	5
do. LG	,, ,, ..	29	0	5½
	,, ,, ...	13	0	5¼
	,, ,, dam	1	0	4½
B&SB	,, ,, ..	8	0	5
	,, sup..	15	notsold	

Herzog. at Delgoa

Mark.	Description & Ship.	Bales.	s.	d.
Star in triangle AA	Grs.com.	11	0	5½
	,, ,, dam	1	0	5½
do. AC	,, ,,	10	0	4¾
do. A	,, ,,	4	notsold	
	,, sup.	8	0	4¾
	,, + com.	1	0	4¼
	,, sup.	15	0	4½
do. CC	mix ..	2	0	3
B&SB	Grs.blk.	1	0	2¾

Mark.	Description & Ship.	Bales.	s.	d.
	Bundesrath. at Delgoa			
Star in triangle	Grs.com. ..	8	0	6
	,, ,, dam ..	1	0	$5\frac{1}{2}$
do. FB	,, ,, ...	6	0	5
	,, ,, dam ..	2	0	5
	,, ,, ,, ..	1	0	$4\frac{1}{4}$
do. MC	,, ,, ...	8	0	5
	,, ,, dam ..	2	0	$3\frac{1}{2}$
	,, ,, ,, ..	1	0	5
D in triangle LL	,, ,, ..	7	0	$4\frac{1}{2}$
	,, ,, ..	16	0	$4\frac{1}{4}$
	,, ,, dam ..	1	0	$4\frac{3}{4}$
	,, ,, ,, ..	2	0	$4\frac{1}{2}$
	mix.	7	0	$3\frac{1}{4}$
	Kanzlar. at Delgoa			
Star in triangle	..Grs.com. ...	12	0	$5\frac{1}{4}$
	Scot.			
L in triangle	..Grs.sup. ...	9	0	$3\frac{3}{4}$
K in triangle	..sn.-wt.sup. ..	78	1	$0\frac{1}{2}$
H in triangle	,, ,, ..	26	1	2
	,, ,, ..	2	1	$0\frac{1}{2}$
	Tantallon.			
K	sn.-wt.sup. ..	4	1	$2\frac{1}{2}$
	,, ,, ..	28	1	$1\frac{1}{2}$
	,, ,, ..	33	1	1
	,, coarse ..	4	0	8
	Scd.sup.blk. ..	6	1	1
	,, grey ...	1	0	7
	,, ,, ..	3	0	$10\frac{1}{2}$
T in triangle	sn.-wt.sup. ..	14	1	1
	,, ,, ...	26	1	$0\frac{1}{2}$

7, Butler Street, Cripplegate,
London, E.C., March 27th, 1901.

The second series of Colonial Wool Sales for the current year commenced on the 12th instant and closed this day. The Brokers' priced catalogues were enfaced as follows :—

	BALES.
Sydney	38,644
Queensland	25,329
Victoria	21,991
Adelaide	10,902
Tasmania	767
West Australia	11,123
New Zealand	44,303
Cape and Natal	15,600
Total	168,659 Bales.

Purchases for export are estimated at about 66,000 bales, whilst "held-over" and "bought-in" parcels are computed at somewhere about 64,000 bales, for realization in the ensuing series to commence here on the 30th April, 1901.

STABLES, STRAKER & CO.

RAINFALL, MARCH, 1901.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory (*a*) 12 inch gauge ..	0·33
Do. (*b*) 8 inch gauge ..	n.r.
Do. (*c*) 8 inch gauge on roof	n.r.
Cape Town, Fire Station ..	0·30
Do. South African College ..	0·32
Do. Sea Point Town Hall	0·26
Do. Molteno Reservoir	0·29
Do. Platteklip ..	0·48
Do. Signal Hill ..	0·12
Table Mountain, Disa Head ..	n.r.
Do. Kasteel's Poort ..	1·42
Do. Waai Kopje ..	1·52
Do. St. Michael's ..	1·75
Devil's Peak, Block House ...	n.r.
Do. Nursery Gauge ..	n.r.
Do. Lower Gauge ..	n.r.
Rondebosch	0·75
Newlands (Montebello) ..	n.r.
Bishop's Court	0·75
Claremont (Sanatorium) ...	0·43
Kenilworth	0·58
Wynberg (St. Mary's) ...	0·45
Groot Constantia	0·26
Tokai	0·54
Simon's Town (Wood) ..	0·49
Do. (Gaol) ..	0·32
Blaauwberg Strand ..	0·19
Robben Island	n.r.
Strandfontein	n.r.
Camp's Bay	0·16
Fish Hoek	0·30
Cape Point	0·08
Smith's Farm	0·61

II. SOUTH-WEST:	
Eerste River	0·15
Klapmuts	0·39
Stellenbosch (Gaol) ..	0·26
Somerset West	0·43
Paarl	0·35
Wellington (Gaol) ...	0·17
Do. (Huguenot Seminary)	0·21
Weltevreden, Groot Drakenstein	0·49
Tulbagh	0·05
Kluitjes Kraal	0·57
Houw Hoek	
Ceres	0·53
Rocklands	0·47
Caledon	0·11
Do. (Gordon) ..	
Worcester (Gaol) ..	0·70
Do. (Meiring) ..	0·68
Hex River	0·32
Lady Grey (Div Robertson) ..	0·00

II. SOUTH-WEST—*continued.*	INCHES.
Robertson	0·00
Do (Govt. Plantation) ..	0·00
Montagu	0·00
De Hoop (Div. Robertson) ..	0·00
The Oaks (Div. Ceres) ..	0·61
Weltevreden near Stanford ...	1·10
Rawsonville	0·22
Danger Point	0·21
Karnmelks River	0·29

III. WEST COAST:	
Port Nolloth	0·12
Do. (Howard) ...	n.r.
Klipfontein	0·46
Kraaifontein	0·38
O'okiep	0·81
Springbokfontein (Gaol) ...	0·64
Concordia	1·72
Garies	n.r.
Kersefontein	n.r.
The Towers	0·35
Dassen Island	n.r.
Malmesbury	0·07
Piquetberg	0·12
Van Rhynsdorp	0·30
Clanwilliam (Gaol) ..	0·25
Do. (Seydell) ..	0·00
Welbedacht	n.r.
Hopefield	0·05
Lilyfontein	1·32
Zoutpan	0·04
Anenous	0·34

IV. SOUTH COAST:	
Cape L'Agulhas	1·13
Bredasdorp	0·81
Swellendam	0·69
Heidelberg	0·84
Riversdale	0·76
Herbertsdale	n.r.
Geelbeks Vlei	0·99
Mossel Bay	0·90
George	3·75
Ezelzagt	n.r.
Millwood	7·40
Sour Flats	4·17
Concordia	5·02
Knysna	2·
Buffels Nek	5·0
Harkerville	4·26
Plettenberg Bay	1·9
Forest Hall	3·24
Blaauwkrantz	4·0
Storm's River	4·58
Witte Els Bosch	3·95
Humansdorp	1·76

IV. SOUTH COAST:—*continued.*

	INCHES.
Cape St. Francis	1·23
Hankey	1·68
Witteklip	3·07
Van Staadens (upper)	n.r.
Do. (lower)	2·89
Uitenhage	1·44
Do. (Inggs)	n.r.
Dunbrody	1·48
Port Elizabeth (Harbour)	1·51
Do. (Victoria Park)	1·47
Walmer Heights (near Port Elizabeth)	2·10
Tankatara	2·01
Lottering	n.r.
Shark's River (Nursery)	n.r.
Do (Convict Station)	1·45
Grootvader's Bosch	0·20
Zuurbraak	1·29
Armadale	2·03
Vogel Vlei	1·46
Great Brak River	1·68
Melkhoutfontein	0·83

V. SOUTHERN KARROO:

Touws River	n.r.
Ladismith	0 59
Amalienstein	0·48
Calitzdorp	0·30
Oudtshoorn	0 93
Vlakte Plaats	n.r.
Uniondale	0·98
Kleinpoort	n.r.
Glenconnor	1·30

VI. WEST CENTRAL KARROO:

Matjesfontein	n.r.
Prince Albert Road	n.r.
Fraserburg Road	0·92
Prince Albert	0·65
Zwartberg Pass	2·05
Beaufort West	0·90
Dunedin	n.r.
Nel's Poort	1·75
Camfer's Kraal	1·40
Lower Nel's Poort	1·74
Baaken's Rug	1·39
Willowmore	0·71
Steytlerville	1·20
Roosplaats	n.r.

VII. EAST CENTRAL KARROO:

Aberdeen (Gaol)	1·29
Do. (Bedford)	1·60
Aberdeen Road	2·44
Rietfontein	0·87
Winterhoek	n.r.
Klipdrift, De Erf	1·09
Kendrew	1·64
Graaff-Reinet	1·78
Do. (College)	1·84
New Bethesda	n.r.
Roode Bloem	1·09
Wellwood	n.r.
Do. Mountain	n.r.

VII. E. C. KARROO:—*continued.*

	INCHES.
Jansenville	n.r.
Patrysfontein	1·63
Toegedacht	n.r.
Klipfontein	2·33
Cranemere	2·47
Pearston	2·23
Fredenberg	
Somerset East	2·22
Do. (College)	3·20
Longhope	1·22
Middleton	n.r.
Corndale (Div. of Aberdeen)	
Cookhouse	n.r.
Doornbosch, Zwagershoek	1·87
Middlewater	1·55
Darlington	1·14
Arundale	2·57
Bloemhof	1·03
Glenharry	1·70

VIII. NORTHERN KARROO:

Calvinia	n r.
Middelpost	1·09
Sutherland	0·81
Rheboksfontein	0·86
Fraserburg	0·52
Onderste Doorns	n.r.
Droogefontein	2·02
Gannapan	1·50
Carnarvon	1·65
Wagenaar's Kraal	n.r.
Brakfontein	n.r.
Vogelstruisfontein	1·46
Victoria West	1·82
Britstown	2·31
Murraysburg	n.r.
De Kruis	n.r.
Richmond	1·60
De Aar	1·74
Middlemont	1·46
Hanover	2·33
Philip's Town	2·52
Boschfontein	1·50
Petrusville	n.r.
The Willows	n.r.
Naauwpoort	1·32
Middelburg	1·40
Colesberg	3·07
Tafelberg Hall	2·16
Rietbult (Colesberg Bridge)	1·97
Stonehills	1·18
Cradock	1·98
Do. (Rose)	n.r.
Varsch Vlei	n.r.
Witmoss	n.r.
Steynsburg	2·62
Steynsburg (Nesemann)	2·70
Daggaboer's Nek	1·46
Quagga's Kerk	n.r.
Tarkastad	2·63
Drummond Park	2·29
Riet Vlei	3·10
Brand Vlei	n.r.
Omdraai's Vlei	2·07

VIII. N. KARROO—*continued.*	INCHES.
Zwagersfontein	n.r.
Varken's Kop	1·26
Culmstock	1·87
Doorskuilen	3·53
Houwater Dam	n r.
Hillmoor	n.r.
Glen Roy	2·95
Fish River	n.r.
Spitzkop	3·86
Phizantefontein	n.r.
Biesjesdam	n.r.
Kleinhaasfontein	3·04
Klein Vlei	2·80
Haasfontein	1·64
Beyersfontein	1·96
Zeekoegat	1·75
IX. NORTHERN BORDER:	
Pella	0·60
Kenhardt	0·79
Van Wyk's Vlei	3·51
Prieska	1·83
Dunmurry	4·41
Griqua Town	2·81
Campbell	6·29
Douglas	3·11
Avoca (Herbert)	3·31
Eskdale	2·15
Hope Town	2·44
Orange River	n.r.
Newlands (Div. Barkly West)	7·39
Groot Boetsap	n.r.
Kimberley (Gaol)	7 82
Do. (Stephens)	8.56
Bellsbank (Div. Barkly West)	8·91
Grootdrink	
Barkly West	8·25
Upington	0·89
Trooilapspan	1·48
Rutland	7·40
The Halt	0·67
New Year's Kraal	0·98
X. SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	
Fairholt	1·81
Cheviot Fells (Bedford)	n.r.
Alicedale	n.r.
Bedford (Gaol)	4·12
Do. (Hall)	n r.
Sydney's Hope	2·85
Cullendale	2·91
Adelaide	2·21
Atherstone	2·31
Alexandria	3·17
Salem	2·54
Graham's Town (Gaol)	2·98
Do. (Bact. Inst.)	2·55
Heatherton Towers (near Graham's Town)	1·49
Fort Beaufort	1·68
Katberg	

X. SOUTH-EAST:—*continued.*	INCHES.
Balfour	3·42
Seymour	2 75
Glencairn	4·02
Alice	1·665
Lovedale	n.r.
Port Alfred	3·07
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	1·60
Cathcart	3·46
Keiskama Hoek	1·87
Dynamite	2.81
Thomas River	3·03
King William's Town	3·10
Do. Hospital	3·64
Stutterheim (Wylde)	4·25
Do. (Beste)	3·88
Dohne	3·15
Kubusie	3·04
Blaney	n.r.
Kei Road	4·19
Evelyn Valley	n.r.
Berlin	3·00
Isidenge	n.r.
Pirie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	3·38
Komgha	3·88
Prospect Farm (Div. Komgha)	3·95
East London, West	2·76
East London, East	3·38
Fountain Head	1·38
Fort Cunynghame	n.r.
Katberg Sanatorium	4·22
Scott's Bottom*	2·07
Bolo	4·69
Fort Fordyce	n.r.
Exwell Park, Waku	3 06
Melrose	2·39
Sunnyside	2·21
Chiselhurst	2·97
XI. NORTH-EAST:	
Venterstad	4 24
Ellesmere	3·59
Burnley, Cyphergat	3·35
Burghersdorp	3·47
Burghersdorp (Le Roex)	3·52
Molteno Station	n.r.
Cyphergat	3·80
Thibet Park	3·96
Sterkstroom	n.r.
Sterkstroom (Giddy)	3·17
Rocklands	2·51
Aliwal North (Gaol)	3·20
Aliwal North (Brown)	4·18
Rietfontein	3·50
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	4·95
Jamestown	3·13

*Rain Gauge formerly at "Cuylerville" transferred to "Scott's Bottom."

XI. NORTH-EAST—*continued.*	INCHES.
Queenstown (Gaol)	3·47
Queenstown (Beswick)	5·98
Dordrecht	2·60
Tylden	3·92
Snow Hill	4·21
Herschel	5·57
Lady Grey	n.r.
Bolotwa, Contest	2·68
Lady Frere	4·29
Avoca (Div. Barkly East)	n.r.
Keilands	3 33
Barkly East	4·19
Glenlyon	n.r.
Gateshead	n.r.
Lyndene	n.r.
Mooifontein	3·89
Poplar Grove	n.r.
Biesjesfontein	n.r.
Whittlesea	3·15
Halseston	2·95
XII. KAFFRARIA:	
Slaate, Xalanga	3·76
Ida, Xalanga	2·36
Cala, Xalanga	2·69
Cofimvaba	n.r.
Nqamakwe	3·53
Main	2·60
Engcobo	3·90
Butterworth	3·34
Kentani	2·80
Maclear	4·58
Idutywa	3·32
Willowvale	7·56
Mount Fletcher	3·16
Elliotdale	2 24
Mqanduli	n.r.
Matatiele	n.r.
Umtata	2·72
Qumbu	2·37
Kokstad	2·46
Port St. John's	5·89
Umzimkulu	2·20
Woodcliff	6·15
Tabankulu	n.r.
Kilrush	2·86
Somerville (Div. Tsolo)	3·47
Tsomo	3·36
Mount Ayliff	4·48
Seteba	3·05

XII. KAFFRARIA—*continued.*	INCHES.
Flagstaff	3 67
Qwebe	1·33
Insikien	1·97
XIII. BASUTOLAND:	
Mafeteng	n.r.
Mohalie's Hoek	5·97
Qacha's Nek	3·95
Moyeni Quthing	8·88
Teyateyaneng	8·11
Leribe	n.r.
Butha Buthe	n.r.
Maseru	n.r.
XIV. ORANGE RIVER COLONY:	
Jacobsdal	n.r.
Philippolis	n.r.
Bethulie	3·21
Jagersfontein	n.r.
Bloemfontein	n.r.
Smithfield	n.r.
Wepener	n.r.
Kroonstad	n.r.
Fauresmith	n.r.
Frankfort	n.r.
Ladybrand	n.r.
XV. NATAL:	
Durban, Observatory	9·04
XVI. THE TRANSVAAL:	
Johannesburg	6·96
Do. Cemetery	6·35
Doornfontein	6·78
Bremersdorp, Swaziland	n.r.
XVII. BECHUANALAND:	
Vryburg	n.r.
Maritzani	n.r.
Mafeking	n.r.
Taungs	3·80
Doornbult	n.r.
Morokwen	n.r.
XVIII. RHODESIA:	
Salisbury	n.r.
Hope Fountain	5·55
Geelong	n.r.
Matopa Dam	n.r.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 4th May, 1901, as telegraphed by the Civil Commissioners of the places respectively named, and from Natal, is published hereunder.

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb	F. Barley per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d	£ s. d	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 10	0 18 0	0 12 6	0 10 0	0 11 6	0 10 0	0 15 0	0 10 0	0 15 0	0 1 3	0 0 9	0 0 9	0 1 6	0 4 0	£15 to £18	18/- to 20/-
Beaufort West .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burghersdorp ..	0 10 6	...	0 12 6	0 10 6	...	0 13 0	...	0 12 6	0 7 6	0 2 3	...	...	0 1 0	0 3 0	...	...
Cape Town ..	0 10 6	0 12 6	0 10 9	0 8 0	...	0 10 0	0 11 0	0 12 0	0 17 0	0 0 5¼	0 0 7	0 0 7½	0 1 4	0 2 8	17 0 0	1 4 0
Clanwilliam .	0 11 0	0 15 0	0 13 0	0 8 0	0 11 0	0 8 0	0 11 0	0 9 6	1 4 0	0 1 4	0 0 7	0 0 6	0 1 6	0 1 3	11 0 0	0 18 0
Colesberg ..	0 12 6	...	0 13 0	0 11 6	...	0 16 6	...	0 12 0	0 17 6	...	0 0 5	0 0 7	0 1 6	0 2 9	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ..	0 11 0	...	0 15 0	0 14 6	...	0 15 0	...	...	...	...	0 0 10	0 0 9	0 1 6	0 2 6	...	...
East London ..	0 12 6	0 18 0	0 17 6	0 13 6	0 9 6	0 15 0	0 18 0	0 12 6	0 18 0	0 1 6	0 1 0	0 1 0	0 2 6	0 2 6	22 10 0	1 3 0
Graaff-Reinet ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graham's Town ..	...	...	...	0 10 0	...	0 9 6	...	0 10 0	0 12 9	0 1 5½	0 0 8½	0 0 9½	0 1 9	0 2 10	...	...
Kimberley ..	0 13 0	0 17 0	0 13 6	0 13 0	0 13 0	0 12 6	0 16 0	0 11 0	0 15 0	0 1 6	0 1 0	0 0 10	0 2 0	0 2 9	£17 to £20	18/- to 22/-
King Wm's Town.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Malmesbury ..	0 11 0	0 15 0	0 12 0	0 10 0	...	0 9 6	0 10 0	0 10 0	...	...	...	0 0 6	0 1 6	0 1 4	16 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour, per 100 lb.	C. Boer Meal, per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal, per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 16 0	0 12 0	0 7 6	..	0 6 0	0 10 0	0 7 6	0 16 0	0 1 3	0 0 9	0 0 9	0 1 3	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	0 5 0	0 5 9	...	..	0 12 0	1 0 0	0 1 6	0 0 10	0 0 10	...	0 5 0	25 0 0	1 5 0
Port Alfred	...	...	...	0 12 6	...	...	...	0 8 0	0 12 0	...	...	..	0 1 9	0 2 6	...	...
Port Elizabeth ...	...	...	...	0 9 6	...	0 8 0	...	0 9 0	0 16 6	0 0 9	...	...	0 1 9	0 3 6	..	..
Queen's Town ..	0 12 9	0 17 3	0 13 9	0 15 6	0 12 0	0 16 6	0 16 0	0 12 0	0 15 0	0 2 6	0 0 8	0 0 7	0 1 3	0 4 0	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18 6	1 3 6	0 19 0	0 16 6	0 16 9	...	0 18 6	0 18 0	1 10 0	0 2 0	0 0 9	0 0 9	0 2 0	0 3 6	...	...
Worcester ..	0 11 0	0 15 0	0 12 0	0 10 0	0 14 0	1 0 0	0 11 0	0 15 0	...	0 0 9	0 0 9	0 0 7	0 2 6	0 3 0	£12 to £15	1 5 0

NOTE—Returns have not been furnished by the Civil Commissioners of Beaufort West, Cradock, Graaff-Reinet, King William's Town and Tark .

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AGRICULTURE.

Reports and Prospects.

Fort Beaufort, *May 3rd.*—Rainfall last month amounted to 1.57 inch. Large swarms of locusts appeared in the lower part of the division, but they did not do much damage to crops, the mealie crops being too far advanced. They have pretty well cleared out the sweet grasses, and are now pairing, so we may look out for swarms of young locusts in the near future. These may be dealt with if farmers will unite for their destruction. Early sown mealies and Kaffir-corn are being harvested, and the yield of the latter will be heavy. Stock in good condition and healthy.

B. BOOTH.

Pasture Grass (*Paspalum dilatatum*).

The Hon. F. R. Moor (says the Natal *Agricultural Journal*), it will be remembered, went to Melbourne as a representative of the Colony to assist at the celebration of the festivities in connection with the inauguration of the Federal Government of Australasia. The hon. gentleman visited the different colonies of the continent, one of his chief objects being that of collecting information which might be of service to Natal colonists engaged in agriculture. The results of his observations he will communicate, from time to time, to the *Journal*. The first of the subjects dealt with is the

PASPALUM GRASS.

This grass, which originally came from South America, and is scientifically known as *Paspalum dilatatum*, is attracting attention throughout every part of Australia—in the rain belts and the drought belts, and in the hottest and the coldest districts *Paspalum* is thriving.

"All my enquiries, and all my personal observations," said Mr. Moor, "go to show that *Paspalum* will be one of the best grasses for Natal farmers to try. The grass has a broad leaf, it attains a length of about two feet, it is rank in growth, and anyone only looking at it would come to the opinion that it is altogether too coarse for the pasturing of stock. On handling it, however, that opinion would be changed. To the touch it is soft as velvet, and on the ground it lies thickly matted.

"In New South Wales it is being very extensively grown. At the Hawkesbury Agricultural College of that colony I saw a field of it. The soil was poor and shallow—ironstone and gravel over white pipe-clay. It had been planted some eight months, and was doing well. Already it had been grazed by sheep, and it was rapidly making big growth. The head of the college told me that it was very popular among farmers, and that its cultivation was spreading in every direction. He also assured me that it did not suffer in any way from cold, and that it was one of the best drought-resisting grasses known in Australia. In the back country, well up the mountains, where the cold is intense in winter, he also informed me the *Paspalum* was doing well.

"In Queensland, at Brisbane, I saw a plant of the grass in the Acclimatisation Gardens surrounded by exotic grasses. At the time of my visit the country was suffering from the severest drought ever known. This *Paspalum* was making good growth, while the surrounding grasses were either dying or dead. At the Gatton Agricultural College in the same colony I also saw it. The soil here, unlike that of

Hawkesbury, N.S.W., was rich alluvial, and the growth was magnificent.

"In getting the grass started there is some difficulty, as many of the seeds prove infertile. The most successful method is that of laying out small plots, and by dividing or separating the roots, transplanting therefrom. The planting is done in rows three feet apart, and the plants two feet apart, or preferably, in the opinion of some, three feet apart.

"The seed should be sown during first spring rains. When one paddock has been grazed down, the stock are removed to another.

"I could not get any of the seed of this year's crop before leaving, all available up to that time having been bespoken, but I have made arrangements for a considerable quantity to be sent shortly to the Agricultural Department here for distribution.

"I would suggest the publication of an article which was contributed by Mr. S. M. Williams to the New South Wales *Agricultural Gazette*. All my enquiries, and all my personal observation, bear out what the writer says."

The following is the article referred to by Mr. Moor:—

Paspalum dilatatum.

This grass, introduced into the Richmond River District about six years ago (or in 1892), was quite a new thing, and nobody knew anything as to its grazing qualifications, or as to its suitability for grazing pastures, or of its value as a food for stock. It consequently made slow headway, for farmers generally are averse to trying anything new. Only a few had the temerity to experiment in anything like a practical way, the rest waiting to see how it would turn out. Fortunately for me I was one of the few, and being pleased with the appearance, texture and rapid growth, and noticing the avidity with which stock ate it, I determined to give this grass a fair trial. Four years ago I sowed my first seed, and also planted a few thousand roots to form a seed-bed. My farm is now practically soled with *Paspalum*, and the more I see of it the better I like it. Of course I mix other grasses and clovers as a change for the stock, but *Paspalum* is the basis of the pasture; it has proved itself a mainstay for the stock, growing vigorously when the fierce heat had withered up the other grasses. I have carefully observed it in all its stages and variations, and have now come to the conclusion that *Paspalum dilatatum* is the very best grass for the farmer to rely upon as a permanent pasture. I say permanent advisedly, for after four years' grazing the paddocks are still improving and giving an increased quantity of feed. It is with me carrying a beast to the acre all the year round, and yet, during the season, I have in rotation been able to shut up every paddock, allowing the grass to grow and shed its seed. By this method a perfect turf can be obtained; it does not spread from the roots and joints like some of the other *Paspalum* grasses, of which there is a great variety. It stands any amount of grazing, and the trampling of stock does not injure it. In this district it grows nearly

all the year round, but naturally a little slower during July, August and September. It stands drought well, the frosts do not kill it, and I have even cut it down and run a fire over it, and after this severe treatment it grew as vigorously as ever. There is nothing hard or wiry about this grass ; it is soft and succulent, and there is no part of it from the crown to the seed-heads that the stock will not eat. My observation of grasses has extended over many countries as well as over most of the Australasian Colonies, but I have never met with any grass for general purposes which would equal *Paspalum dilatatum.*

I have no knowledge as to its value for sheep, but all other animals are fond of it, and keep up good condition. Its qualities for dairying purposes are undoubted, and every cow is kept in such condition as to enable her to give her standard of quality in the milk produced. My average test at the milk-separating station is among the very highest, ranging from 3·6 to 4·3 for butter fat. A more reliable test, however, may be found by referring to the *Agricultural Gazette* for May 1896, page 328, where Mr. F. B. Guthrie has given the analysis of *Paspalum* hay. In the *Agricultural Gazette* for August, 1896, Mr. G. M. M'Keown reported on several of the grasses he had experimented with, and it is interesting (page 530) to read what he says of *Paspalum dilatatum* as regards the vast volume of green feed to be obtained per acre.

In connection with the germination of the seed, and the ripening of the seed-heads, certain peculiarities will be noted. The seed, if sown under favourable conditions, takes from eighteen to twenty-one days before it will appear to have germinated, and during that time it requires both moisture and heat, even then it does not all come up at the one time, but plants may soon be noticed at all stages of growth from three inches high to those just breaking ground; the reason for this is, I think, that the earliest matured seeds germinate earlier than those which ripen on the same head a little later. Sown under unfavourable conditions, I have known the seed remain dormant in the ground for ten months, and then suddenly grow. I expect, however, a good many of the best seeds had been destroyed by insects during such a long period. It is therefore no use to sow the seeds at improper times if good results are required. In the Richmond River District I have found the proper times to sow are—middle of July to middle of September, first week in December to first week in February. In the former it catches our spring rains, and in the latter our summer rains—both accompanied by heat, which appears very necessary. The quantity of seed to sow per acre varies with the requirements—5 to 8lb. per acre on well-prepared ground will soon result in a good paddock. If 1½ to 2lb. per acre are sown after grazing, it should be held up about September, and allowed to grow and shed all its seed naturally. It will soon spring up, and the young grass, if anything like a favourable season takes place, will be fit to graze in May. I consider that

allowing the grass to shed its seed naturally is the very best and surest method of thoroughly establishing the pasture.

A striking peculiarity will be noticed in the ripening of the seed. A vast quantity of seed is thrown up, and from appearance one would rely upon obtaining 4 or 5 cwt. of seed per acre—the seed, however, on each head does not ripen simultaneously, first a few grains mature and fall out, then others, and so on for two or three weeks, till all the fertile seeds have been shed; still a lot of seed-sacs will be left, but they are quite empty; the quantity of seed, therefore, of first-class quality which can be saved is exceedingly small compared with the apparent crop. As soon as the stalks begin to bend over and attain a light greenish straw-colour is the time to commence picking; deal very gently with it or you will lose the best of the seed. The heads should then be taken into a barn and well shaken; this shaking may be repeated two or three times next day, by which time all the matured seed will be obtained. In leaving the heads in heaps, be very careful not to allow them to heat, or the seed would all be spoiled. The heads may now for a day or two be turned and threshed, and although the quality of the seed obtained by this second manipulation is very inferior, still a percentage of it will germinate; it may be used, therefore, for scattering thickly over rough ground.

If weather for picking is not good exactly when it should be commenced, and the crop allowed to get a little too ripe, a good first-quality seed can still be obtained, but the sample would be spoiled in appearance by a lot of straw-coloured empty seed-sacs.

A good many people in other districts have found a difficulty in getting the seed to germinate. In my opinion this has been due to their sowing at the wrong time of the year, and in some cases where very unfavourable seasons, droughts, etc., have occurred after sowing. Never sow in the fall of the year, but choose the early spring and summer, just before the ordinary season's rains may be expected.

A great feature too in its favour is that it is not difficult to eradicate if a paddock should be required for cultivation; ploughing alone will not do it, but by cultivation and bringing the plants to the surface, rolling and harrowing to free the roots from soil, it quickly dies by exposure to the sun. It is very tenacious of life if the soil should be left on the roots, especially in wet weather, but it does not grow from pieces of roots like couch and some of the poas, but given plenty of cultivation and stirring and a few fine days and the trouble is over.

When the plants are far apart the grass grows into big tussocks, but as soon as the spaces are filled up it forms quite as good a turf as any of the other grasses.

There can be no question as to its being an invaluable grass, and it is now being eagerly sought for in this district since it has passed the stage of experiment.

Analysis of Hay of *Paspalum dilatatum*. By F. B. Guthrie.

The hay, of which the following is a complete analysis, was supplied from the Wollongbar Experimental Farm, Richmond River:—

Moisture	10·55	...
Total albuminoids	10·31	...
Soluble albuminoids	...	1·38
Insoluble albuminoids	...	8·93
Digestible fibre	29·96	...
Woody fibre	27·95	...
Total ash	6·37	...
Soluble ash	...	4·32
Insoluble ash	...	2·05
Amide compounds, chlorophyl, &c. (by difference)	14·86	...
Total nitrogen	...	2·66
Nitrogen in amide compounds, &c.	...	1·01
	100·00	

I subjoin an analysis of hay from meadow grass (name unknown) of English source, which will afford a comparison of the value of these fodders. From this it will be seen that the amounts of total albuminoids, and of digestible fibre, which are the chief factors in determining the feeding value of the hay, are very similar, with a slight advantage in favour of the *Paspalum* hay. The solubility of the fibre, albuminoids, and mineral matter being, moreover, greater than with English hay. The most striking peculiarity is, however, the comparatively large amount of nitrogenous matter other than albuminoids. The nitrogen in these combinations is of comparatively no feeding value.

Analysis of Hay from Meadow Grass.

Moisture	14·00
Soluble albuminoids	·98
Insoluble albuminoids	7·89
Digestible fibre	28·68
Woody fibre	22·92
Soluble ash	2·20
Insoluble ash	4·66
Amides, &c. (by difference)	18·67
Total Nitrogen	1·54
Nitrogen in amides, &c.	·12

The *Paspalum* hay compares very favourably with ordinary hay, containing a larger proportion of digestible and nourishing material.

If both analyses are calculated to dry substance, it will be found that the *Paspalum* hay shows the higher albuminoid content, the amount of digestible fibre being almost identical.

Florida, Wollongbar, N.S.W.,
November, 1900.

Since the foregoing papers were written, I have everywhere extended my cultivation of the *Paspalum dilatatum* grass, and the more I see of it the better I like it; in fact, for a *permanent pasture giving a vast volume of good feed,* it has no equal, it makes a perfect pasture when hard grazed, and, as it does not mat on the ground, all the other grasses and clovers come up through it in their respective seasons, and thus give the *mixture* which is so necessary and beneficial for the stock.

A good deal of difficulty has been experienced by some in getting the seed to germinate, but although it sometimes tokes a long time to show up, my experience has been that if good seed is used it will certainly come, and I conclude the difficulty has generally arisen through purchasing an inferior quality seed. The spring is usually the best time to sow, but even if the seed is sown out of season it will not damage in the ground, but will germinate as soon as the conditions are favourable.

For quick results the planting of roots is adapted, and in my opinion it is an excellent plan; they can be planted at almost any time of the year. The method I have adopted is to plant them four or five feet apart each way, and then sow the ordinary grasses and clovers over it, in the proper season; the *Paspalum* will soon spread its seed and a good pasture be obtained. If the plants are put in during the early spring, they will at once make rapid growth, and in five or six weeks will give a lot of feed. Strong, old roots should be chosen, as they contain enough moisture to start the growth, whereas seedling plants are very likely to die out. In planting, always use the spade, not the hoe; insert the spade, push the plant well down behind, withdraw the spade and trample firm. In this method a man and boy can plant from 1 to 1½ acres a day, and if the plants are good and properly prepared there will be very few misses.

I have for a long time been carrying more than a beast to the acre, and have not found it necessary to grow any artificial food such as green oats, sorghum, &c., and this in itself is a great saving of expense.

From January to the end of May last year, I was obliged to take stock on agistment in order to keep my paddocks well grazed down; during that period I carried *two-and-a-half* beasts to the acre, and the owners of the cattle on agistment hoped I would let them bring more stock next season. This speaks for itself.

The analysis of the hay will show that the *quality* of the grass is undoubted, and I would strongly advise my brother farmers to use every endeavour in getting it established in their pastures. Do not, by any means, abandon the other grasses, cocksfoot, rye, prairie, and the clovers, as the mixture is necessary for the health of the stock.

There is no reason why our pastures should not give good feed all the year round if proper grasses are selected. The *native grasses* will not do it alone, as their season at the best is very short, and an unfavourable season renders them practically useless.

New Varieties of Potatoes.

That a sort of potato which at its first introduction and cultivation is prolific and healthy, and after a few years or crops becomes unprofitable to plant, is the experience of all large cultivators. A correspondent of the *Field* in an article on potato cultivation lays the following stress on the importance of procuring and planting new varieties; by which is meant not simply new to the country, or neighbourhood, but a new sort, which within a few years has been produced from the seed contained in the potato apple :—

"The selection of seed is a matter of very vital importance, in these days of prevalent disease especially. It is extremely undesirable that weak or unwholesome tubers should be planted, as disastrous consequences will almost inevitably ensue from such a grave mistake. The chief ambition, therefore, should be to procure strong, vigorous seed, which has not been too far removed by repeated reproduction from the original offspring of the plums, or seed proper. It is an established truth that extended cultivation impairs the vitality of the potato, and thereby renders it more susceptible to be ravaged by disease. The tuber, perhaps more than any other farm crop, is liable to degenerate in this way by reason of the method of reproduction generally adopted in practice. Other crops are allowed to mature and reproduce themselves from their seed, in accordance with the ordinary course of nature, but the potato is seldom managed in this way. Reproduction is effected through the tubercular or root growths, instead of by means of the seed proper, which forms on the shaws above ground, the new crop therefore being merely a continuation of the preceding one, and not the offspring of it. There can be little doubt that the prevalent state of disease nowadays is mainly the outcome of weakened vitality in the plant, a condition of things which renders it extremely desirable that the development of new varieties or generations from the seed should be carefully attended to. Thanks to the enterprise and industry of certain growers and seedsmen, this important matter has been closely looked after in recent years, but their labours in this direction were not begun a day too soon, and there are still in cultivation several varieties whose susceptibility to injury by disease renders their retention undesirable. The ravages of disease may be appreciably minimised by the timely application of the spray, but it is extremely important nevertheless that such disastrous attacks should be guarded against by the use of healthy, vigorous seed."

Fortunately, of late years, the necessity of successful potato growing has been given intelligent attention, and new and valuable varieties have been raised to supply cultivators, which should be obtained and planted more generally.—EDITOR.

Phosphates and Phosphoric Acid.

As superphosphates and other phosphatic manures are coming pretty largely into use, it is desirable that the exact meaning of the above terms should be well understood. For though all phosphates contain phosphoric acid, yet in quotations from an analysis given by a manufacturer or seller it is all-important to have a definite statement of which of the two substances is meant. For the value of the manure depends on the available phosphoric acid it contains.

On this subject Mr. Pearson, Government Agricultural Chemist of Victoria, thus advises the farmers :—

"It has been reported to me that farmers in some of the country districts who are intending to order manure for the coming season are likely to be somewhat misled as to the relative meaning of phosphoric acid and phosphates. Some years ago it was the custom to value phosphatic manures according to the amount of phosphate of lime contained in them. But as there are no less than four different kinds of phosphate of lime, each of which contains different proportions of phosphoric acid and lime, confusion and misunderstanding arose from this method of representing the value of manures, a confusion which almost universally resulted to the disadvantage of the purchaser. Consequently, leading agricultural chemists in recent years have discarded the use of the term phosphate in manure analyses, and have confined themselves simply to the essential plant food in the manures, namely, the phosphoric acid, distinguishing between the three kinds, water soluble, citrate soluble, and insoluble. The "water soluble" is that form which is most readily available, and every 1 per cent. of it in a ton of manure is worth, at average Melbourne prices, about 6s.; so that 2 per cent. would be worth 12s.; 10 per cent. 60s.; 15 per cent., 90s., and so on. The "citrate soluble" is not soluble in water, but is soluble in weak solutions such as are contained in the soil, or are exuded from the roots of plants. It is somewhat less valuable than the water soluble, and every 1 per cent. in a ton of manure may be taken as worth 4s. 6d. That which is called "insoluble" is not absolutely insoluble; it is, however, only very slowly soluble in the soil. It requires strong acids to bring it quickly into solution. Every 1 per cent. of this form in a ton of manure may be taken as worth about 3s.

It is advisable when buying superphosphates and other manures of the same class to pay attention simply to the percentage of phosphoric acid, and to neglect altogether any statements as to the amount of "phosphates." It is greatly to be desired that manure merchants and vendors should altogether discard the use of the term phosphates —a term which really misleads farmers, and tends to perpetuate ignorance as to the real nature of manures.

The confusion arising from the use of the term "phosphates" is well illustrated by what has been reported to me recently in regard to concentrated and ordinary superphosphate. Concentrated super-

phosphate contains 45 or 46 per cent. of phosphoric acid, nearly all water soluble. It is offered now at £13 10s. per ton. Last year it was offered at £12 10s. The ordinary superphosphates vary somewhat, but generally they contain about 17 to 19·9 per cent. total phosphoric acid, of which two-thirds is water soluble. They are generally sold at £5 per ton.

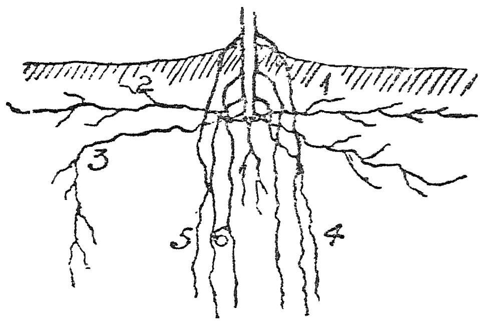
Now 17 per cent. of phosphoric acid, if combined with lime, would form 37 per cent. ordinary phosphate of lime—37 is a larger and more imposing figure than 17; and it is easy to confuse farmers by talking about 37 per cent. phosphates. I am told that ordinary superphosphates are being commonly advertised as containing 36 to 48 per cent. soluble phosphate; and to farmers who have intended buying concentrated superphosphate it is being said "Why should you pay £14 10s. per ton. for a manure containing 45 per cent. phosphoric acid, when you can buy what we offer, containing nearly the same amount, namely, 36 to 38 per cent. soluble phosphate, for only £5 per ton?"

To compare manures one with another, it is necessary to always use the same terms; either they must all be valued in terms of phosphoric acid, or else they must all be valued in terms of phosphate of lime. It will never do to sometimes use one system and sometimes the other?

If phosphoric acid be agreed upon as the term for common use, then concentrated superphosphate will be represented as containing 45 or 46 per cent. of phosphoric acid, mostly water soluable, and ordinary superphosphate will be represented as containing 16½ to 17½ per cent., or more, phosphoric acid, mostly water soluble. If phosphate of lime be agreed upon as the term for common use, the concentrated superphosphate must be stated as containing from 98 to 100 per cent. phosphate, mostly water soluble, and the ordinary as containing 36 to 38 per cent. phosphate, mostly water soluble.

I feel sure that I can successfully appeal to all respectable manure manufacturers and merchants, who recognise that the spread of precise knowledge as to the real nature of manures is in the interests of all concerned, to adopt that system which has been agreed to by a consensus of opinion amongst the leading chemists of the day. All buyers of superphosphate should insist upon being informed as to how much water soluble phosphoric acid the manure is guaranteed to contain."—EDITOR.

Mealie Root System.



GROWTH AND POSITION IN THE SOIL.

The above numbers indicate that figures 1, 2 and 3 are surface roots or food gatherers, 4, 5 and 6 go down into the subsoil.

The Kansas State Board of Agriculture have published a report of some carefully made investigations relative to the position of these roots and their work in the soil, showing their arrangement and development at a certain time for certain duties :—

"The seed roots (says the *Farmers' Review*) sustain the bud until the first green leaf appears. The first roots then follow, and seek the surface soil, which first feels the sun's warmth. These are in turn supplanted by the first circle roots that radiate from the butt end of the stalk like the ribs of an umbrella from the shaft, and spread out on a lower level, usually 5in. to 10in. below the surface, and often exceed 8ft. in length. These first circle roots are the main food gatherers, and send out numerous fibrous branches in the direction where water and food are most abundant and temperature most favourable. The second and subsequent circle roots develop one after another as the plant increases in height, and the soil is warmed to a greater depth, seek the subsoil, and rarely spread out on the surface. Figures 2, 3, 4 and 5 show such roots, which were followed to a depth of 4½ft., with no terminal point in sight."

There are one or two points in the above extract which are of practical interest; one of which is that as the food-collecting roots travel near the surface, cultivation must not be deep enough of the growing crop to damage them or cut them off. And it is also a matter of great importance that there be no pan in the soil a few inches below the surface, or any other impediment to the striking down of the moisture-seeking roots into the subsoil, especially in a dry season.—EDITOR.

Retention of Moisture in the Soil.

In order to retain the moisture we must first have it, namely, in the soil. The storage of moisture during the winter, therefore, is the principal condition for the successful preservation of it during the spring and summer months, consequently our efforts will have to be made in both directions alike if we wish to attain our ends, that is, the raising of paying crops in case of a dry season.

The character of the soil has, of course, to be taken into consideration when it comes to solve the problem of how to store moisture effectively. In a light, sandy soil, for instance, with subsoil similar to top, our efforts in that direction would be futile; as such a soil has very little capacity to hold moisture well, it therefore must be irrigated, or else the ground water must come up within three feet of the surface, so that by proper working of the top soil the moisture may be forced up through capillary attraction.

It stands to reason that the larger the store room the larger the amount of moisture will be that may be stored away during the winter months. With this purpose in view we first learn of the principal requirements to enlarge the capacity of our soil for holding a greater amount of moisture well. These requirements are:

1. Tile drainage.
2. Deep culture.
3. Manuring.

1. Tile Drainage.—The heavier soils contain a larger percentage of clay, from at least 30 per cent. and upward, the fine particles of which lodge tightly together, in this wise resisting the penetrating of the moisture into the subsoil, and, on the other hand, the capillary attraction from the subsoil to the surface. The system of capillary tubes prevalent in every well-drained soil is here found in a crippled condition only. The soil is cold while suffering from too much moisture in the subsoil, and is non-porous and therefore subject to erosion in case of heavy rain. It "washes," as the common expression is, in this wise losing its mulch on top, and with it the best soil, year after year. Tile drainage, if well carried out, will develop what we must have first to make the soil porous, that is, a perfect system of capillary tubes, which will allow the moisture to penetrate into the subsoil and discharge the surplus of it through the tile drains. We say surplus, because a good many people are of the opinion that a tile-drained soil will be still more dry in the droughty season, but that is entirely erroneous, and the contrary is the case.

The system of capillary tubes being well developed, which development usually is finished two years after the drains are laid, puts the soil in a condition which may be likened to that of a sponge. Now, if water is poured on to a sponge, it will first fill up, and after it can absorb no more the surplus will flow off, but no more. So soon as we stop pouring water on the sponge, evaporation

sets in, and in the course of time the sponge would become dry, but in case it should rest on some moist substance the moisture from underneath would be drawn up by capillary attraction and fill the pores of the sponge again. Our tile-drained soil, therefore, is a sponge to depth at which the tile drains are laid, resting on the moist subsoil underneath. But tile drainage in itself is not sufficient to enlarge the water storing capacity of the soil. It must go hand in hand with it.

2. Deep Culture.—A soil stirred up to a depth of from 12 inches to 18 inches will hold more moisture than one ploughed but from four inches to six inches deep. A heavy soil, though tile-drained, may still be apt to wash in a heavy shower if ploughed but shallow, which is not the case in another one stirred to the depth heretofore referred to, because the water is more speedily absorbed, as there is ever so much more room for it, the surplus being taken up by the well-developed system of capillary tubes in the subsoil which again discharge their surplus into still deep-lying soil, and after that is filled up the remainder is taken up by the tile drains and flows off into the main ditch. Deep culture is, therefore, another essential point in making a heavy soil porous, and porous we must have it to enlarge its water-storing capacity. But the deep stirring must be done in fall and not in spring, as by it the system of capillary tubes is destroyed on top, and thereby its usefulness in forcing the moisture up from underneath by capillary attraction in case of a dry spring. By turning the soil in spring and subjecting it in this wise to the influence of the wind and sun, a lot of moisture escapes, and this is so much more the case the deeper the soil is turned over. But by stirring it to a considerable depth the soil is also loosened, and as the capillary tubes have not sufficient time to form again and seek connections with those of the subsoil, it is liable to dry out much quicker in case that dry weather should prevail for some time after planting.

If the deep ploughing be done in the fall it is quite different. The then porous soil fills with moisture and settles, the capillary tubes begin to form and connect with the system of the subsoil, which fills itself also with moisture, so that when spring comes the whole system of capillary tubes is perfect and ready to perform its functions. But as it would be folly to plough a formerly shallow ploughed soil deep at once, in this wise throwing up a larger amount of dead soil, we must make use of a subsoiler until the soil has been gradually deepened to the required depth. To begin with deep culture we take an ordinary breaking plough and plough to the usual depth, perhaps one or two inches deeper, following this plough with a subsoil plough that will stir the bottom of the furrow deep enough so that a depth of at least twelve inches is attained, but if it be eighteen inches so much the better; then we allow the soil to lay in the rough furrow over winter. But as our efforts must be directed toward gradually deepening the soil, so that after a while we may dispense with the use of a subsoiler altogether, and as

we will have to convert the thrown-up dead soil into a live soil, we must also take into consideration

3. Manuring—that is, the manuring with well-rotted stable manure applied in the fall. Manure not only supplies plant food, but acts on the soil like yeast in dough. It makes the soil porous and enhances its moisture-holding capacity, at the same time giving activity to the dead soil that may be thrown up on top. If manure —especially well-rotted manure—be applied in spring, it will act like deep ploughing after winter, and leave the soil in too loose a condition, which consequently will dry out too quickly in case of dry weather, our efforts to the contrary notwithstanding. Every farmer will have made this observation when ploughing under in spring the remainder of an old hay or straw stack—that his crops in such spots suffer more from drought than those near by.

So much about the applying of stable manure and its beneficial effects upon the soil. But we must not lose sight of our subject, "How to Retain the Moisture in the Soil." We have learned that turning it in the spring should be avoided, and yet this may be necessary, in case the soil should have a tendency to flow together on the top. This tendency would be a drawback to our efforts, and to check it forms also a part in our endeavours to store and retain the moisture in our soil. Wherever a heavy soil flows together in spring, or after a heavy rain, it is a sign that it is deficient in lime—at least, as far as the top soil is concerned—and all we have to do is to make up this deficiency by applying a coat of carbonate of lime to the extent of from one-half to one ton per acre, one-half ton being sufficient for a loamy soil, and one ton and upward for soils of a heavier character. This must also be done in the fall, and the effect will generally last for from six to ten years. As lime constitutes a plant food in itself, it properly comes under the third heading—that is, manuring. But its effects are also beneficial as regards the physical action of the soil. It helps to make it porous, and dissolves otherwise insoluble plant foods, constituting, therefore, a very valuable agent in converting dead soil brought to the surface into live soil.

After our soil is fitted well, so as to provide as much store room as possible for all the moisture that can properly be absorbed over winter, our next efforts will be in the direction of retaining it, so that we may raise a paying crop, even in case of a dry season.

As heretofore said, we should avoid ploughing in spring, but the soil must be loosened on top and fixed for a seed bed. Any cultivator which will loosen the soil but not turn it may be used for this purpose, the harrow and the roller following until the soil is fine enough for a seed bed. We must first loosen the soil and then pack it again by the use of a roller, as this will have the effect of drawing the moisture from underneath which is required to germinate the seed. A smooth roller is undesirable, as this will leave the soil on top in too fine a condition, and render it liable to dry out too quickly, but a disc roller, which will break the clods if there be any and pack

the soil and yet leave it with a comparatively rough surface, is preferable.

It goes without saying that the soil should not be worked until it is dry enough on top, so it will work well without breaking up into chunks or the forming of clods. A well drained, deeply ploughed, and manured soil will become dry on top a great deal sooner in spring than one not in this condition. The first work in spring always consists in harrowing the soil as soon as the horses can step on it, being followed later on by the cultivator, harrow, and roller used in conjunction.

Care should also be taken that the sowing is done as soon as the seed bed is prepared, dropping the seed in the moist ground, as in this wise it will germinate quicker and allow the farmer to cultivate before any great amount of moisture is lost from the ground by evaporation. The use of a roller is necessary, as this will force the moisture from the subsoil to the top soil by capillary attraction, and near the top is where we need the moisture to germinate seed. But at the same time, there will be a loss by evaporation if we do not guard against it, and this can be done successfully only by keeping the top soil stirred, in this wise providing a mulch which will check evaporation. The moisture, filling the well-developed system of capillary tubes in our soil, is ever active. It either, in case of over-abundance, follows gravity and goes down into the subsoil, or else, in case of a scarcity of it on top, rises up by capillary attraction.

If the soil is not stirred the little tubes are uncovered on top, and the wind or moving atmosphere, by blowing over them, sucks the moisture up and carries it along in the form of vapour. How this is accomplished every-one familiar with the working of an atomizer will readily understand. The small stream of steam generated in the boiler of the machine, blowing over the top of the tube in front, which rests in a basin filled with some medical solution, sucks by its action the solution up until the basin is empty. So it is with the system of capillary tubes in our soil. If we do not cover them up on top the moisture in them will soon be exhausted, and we therefore have to keep the soil stirred, no matter if it appears to be loose. We must shift it from one place to another, so as to prevent the connection of the capillary tubes with the atmosphere, until a further working of our crops would only injure them, when we lay them by and leave them to take care of themselves, because then there will yet be enough moisture in the ground to carry them through to maturity.—*Sugar.*

Keeping Land Clean from Weeds.

The following observations by an agricultural correspondent of the Melbourne *Weekly Times* are appended:—

The advantage of keeping the land clean will be admitted by every cultivator, whether farmer or gardener, though, strange to say, a great many allow it to get foul with weeds for lack of proper attention to its requirements. This is the case with the tillers of the soil generally, but more especially do many Australian farmers err in this respect. The too common practice in this part of the world is to get as many acres under crop as possible, and little, or even, in some instances, no further attention is given till the harvest time arrives. Though this may be the easiest way of farming, it is not the most economical in the long run. On the contrary, it is a most wasteful and thriftless practice.

Common sense should teach everyone that the cleaner the cultivation, the better the crops may be expected to be.

Land cropped in a foul state is not only laid under contribution for the production of a crop of serviceable plants, but has also to support a number of others that are useless and troublesome to the cultivator. Now, it must be perfectly plain to the most ordinary mind that, when crops have to contend with large numbers of weeds, the growth must be interfered with more or less. When land is foul with weeds there is a much heavier tax upon its productive powers when cultivated for a crop than if it were clean. In order to obtain the best possible returns, not only are good land and favourable seasons necessary, but the crops must also be cultivated in a rational manner. The plants that form a crop require the whole of their space, if properly apportioned to them, for their free development, and they cannot be expected to thrive to the fullest degree when they have competitors struggling with them for a share of the soil.

Annual crops, the cereals, for instance, feel this competition very much, and frequently from this cause alone turn out complete or partial failures. When wheat or other cereals are sown in land that is foul with wheat germs, their growth often commences simultaneously, and the crop plants are either smothered by the useless vegetation or suffer seriously in their struggle for existence. Even if by chance the crops are enabled to make a fair amount of headway, they are often injured afterwards by an undergrowth of weeds, which absorb a large amount of nutriment and moisture. On the other hand, in thoroughly clean land, cereal and other crops are able to get a fair start and make good headway without the interference of alien plants.

Crops have not only a better chance of coming to perfection in clean land, but they will also come to maturity earlier, as a rule. This is an advantage that all farmers must appreciate, but especially so in this part of the world, where cereal crops often suffer from the

effects of dry weather just before they reach maturity. In many cases crops would not suffer materially from the hot weather if their growth were a little more advanced before it set in. Besides, the earlier the crops are the less liable are they to the attacks of those fungoid and insect pests which are too often troublesome to our farmers.

To Eradicate Weeds.—Weeds may be divided into two classes, and they require somewhat different treatment to eradicate. The annual kinds, which are the most numerous, can generally be destroyed or kept under without much difficulty by allowing an occasional fallow, and ploughing them in before they perfect their seeds. When the annual kinds of weeds have been plentiful in a grain or other crop, it will be advisable to take steps for their eradication as soon as the harvest is over. They will generally start with the advent of the first rain, and the operation of germination will be facilitated by a slight scarifying of the surface soil previously.

Weeds that are perennial in their habit are, however, somewhat more difficult to deal with; but labour and patience will generally keep them under. In order to free land from this kind of vegetation, it must be left uncropped for a time, and the surface frequently broken with the plough or scarifier. When land gets foul with these kind of weeds, it is better to throw it out of crop for a season or two than to persist in cultivation that will necessarily give but poor and unsatisfactory returns. The excuse with many for slovenliness in cultivation is the want of time to do things properly, and the difficulty of finding the necessary labour at the time it is wanted. But though some extra labour is undoubtedly required to keep land well cultivated, it will, when tried, be found the most economical plan in the long run. It is useless for farmers to expect satisfactory crops if they make no efforts to keep their land free from weeds, and to obtain clean seeds, even if the other conditions of cultivation are favourable.

Clean During Growth.—But, in addition to the greatest care in the cleaning of the land before the crop is put in, and the selection of seed a system of cultivation cannot be deemed perfect unless efforts are made to destroy alien vegetation while growth is progressing. This is generally admitted in garden practice with our own cultivators, and by farmers in countries where agriculture is carried on systematically; but in growing grain crops in this part of the world it is quite ignored. The farmers of Great Britain find it pays them best to put in cereal or other crops in such a way that they may, without difficulty, be kept free from weeds during the early stages of growth. In that country, as also in others where agriculture is carried on systematically, grain crops, as a rule, are put in the ground with a seed-drill in regular rows. Under this system there is no difficulty in using cultivating implements during the early stages of growth, and consequently crops can be kept free to a great extent from alien plants. This is a great advantage, as it enables cultivators to place

their crops under the most favourable conditions for a free and uninterrupted growth.

And not only are the conditions for growth more favourable when the drill is used, but it also effects a considerable saving in the quantity of seed required. In fact, not more than half as much is required as in sowing broadcast, which is the plan generally followed in this part of the world. By the use of drilling machines the seed is sown regularly at a uniform depth, and nearly every grain that is put into the ground becomes a serviceable plant. On the other hand, when seed is scattered broadcast over the surface of the ground, the crops are apt to come up irregularly, and many of the grains do not germinate at all.

By keeping crops free from weeds that would interfere with their growth, and allowing sufficient space between the plants for free development, the cultivator must necessarily obtain much better returns than if these essentials are neglected. In garden practice these conditions are generally observed by cultivators, and the more closely they are observed by agriculturists the better.

STOCK FARMING.

The Necessity and Use of Salt as Food.

The Auckland *Weekly News* says:—

"Some persons make a distinction between foods and other needed substances that are indispensable for the welfare of our domestic animals. It is well to understand this distinction, which we think should exist or be encouraged. Food, we believe (says *American Sheep Breeder*), is those substances of a solid kind distinguished from liquids which go as drink, and yet may really be food, and which are necessary for the support of the vital functions of an animal. Indeed, we include vegetables in this category, for they absorb, digest and assimilate needed nutriment very much the same way as animals do. Nay, we may go further, and consider the relations of animals and plants to be so close, that it is chiefly in form, and not in function, that the two great classes so closely approach each other in habit that it is only by one special function that we are able to detect the difference between the animal and the plant. We then say salt is good. *It is indispensable to the life of all animals.* It is digested, enters into the circulation, becomes part of the blood, and is assimilated into the very substance and tissue. Then, as we know, the food of an animal must contain every element

needed for the complete life of it, and what the ordinary food does not contain must be made up in other ways, and if the ordinary food does not contain a sufficiency of salt in it, it is indispensable that we must make up the deficiency in some way. Thus we make a practice of supplying animals with salt, which does not exist in the food in sufficient quantity for their needs. Salt has a very important function in the digestion of food. A part of the gastric fluid by which the stomach is enabled to dissolve the food consists of the acid of salt, known as hydrochloric acid, and this we must believe is derived from the salt existing in the food itself. But this is not in sufficient quantity to supply the needs of the stomach, and thus salt is of direct service in this first stage of digestive functions. It is also of service in stimulating the circulation of the blood, and increasing its effect in the vital processes. This is especially necessary to the existence of animals, and is mostly so in regard to the herbivorous species; and thus salt is not in any way a luxury, but an actual necessary of life, and mostly so to those whose vital functions are at times more active than others. Thus male animals at the reprodu ctive seasons need an increased supply of salt to sustain the drafts made on their vitality. At the breeding season, then, the supply of salt for a flock should be increased proportionately to these needs. It is the same with fattening animals, for the digestive processes are stimulated, as well as the fluids of the body increased, thus adding somewhat to the increased live weight as well as the dressed weight. The meat is thus made more tender and of better flavour. And in addition to this, the food is made more savoury, the appetite is stimulated, and more food is eaten and digested. And as the sheep is almost in need of this stimulating of the appetite, and of the full effect of the food, it is indispensable that the supply of salt should be continuous all through the year."

Providing a good supply of salt is a preventive to sheep being infested with fluke. We knew a case where in England all the sheep on a farm had been fatally banned or infested with fluke two years following, and the farm being given up by the tenant and then occupied by the owner. He at once, on entering into occupation, sent a wagon-load of salt, which was given to the sheep constantly, and though the next two years were severe banning years there was never a sheep lost by fluke. As the man came out with a pail of salt on his head and let the gate slam, you could see the sheep running to meet him all over the farm. There is no trouble in getting stock to eat salt if they require it.—EDITOR.

Angoras and Mohair.

The accompanying illustration from the *Sydney Herald* certainly favours the hope expressed, in the article on Mr. Scammel's goats in No. 7, p. 409, that Angora farming will not be as unsuccessful in Australia as in the past. They are handsome goats, and apparently well bred. We cannot, of course, tell from pictures the quality of the hair, which is the all-important point or test of its value.

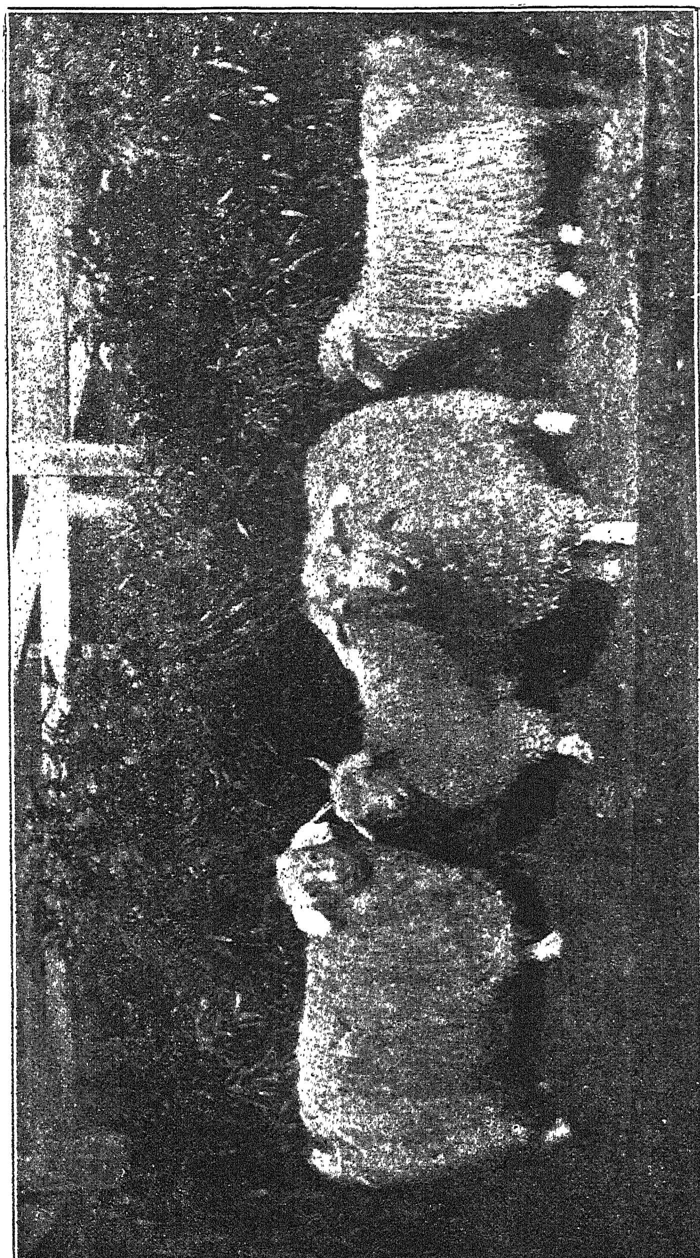
That *quality*, which really means fineness, of the hair determines its value to the manufacturer, has of late years been too forcibly impressed on the minds of mohair producers. For while with wool, clips less fine than the top quality will find purchasers at a relative price, it appears that the lower qualities of mohair find but slow demand even at reduced prices. This unsatisfactory state of the Colonial mohair trade is a matter of very serious concern and much anxious enquiry as to what can be done.

To obtain some specimen fleeces of the mohair which *does* suit the manufacturer, for the inspection of our Angora farmers, will no doubt be useful. For to know what is wanted is the first thing to be done to encourage the production of a supply of the required article. Our ordinary mohair is suitable for making some articles, like braid, which was in fashion a few years ago, the demand for which is limited and with change in fashion uncertain. We shall be glad of any suggestions of measures to be adopted for remedying the present disappointing state of things.—EDITOR.

Endurance of Basuto Pony.

The following is taken from the letter of a Queenstown correspondent of the *Live Stock Journal*:—

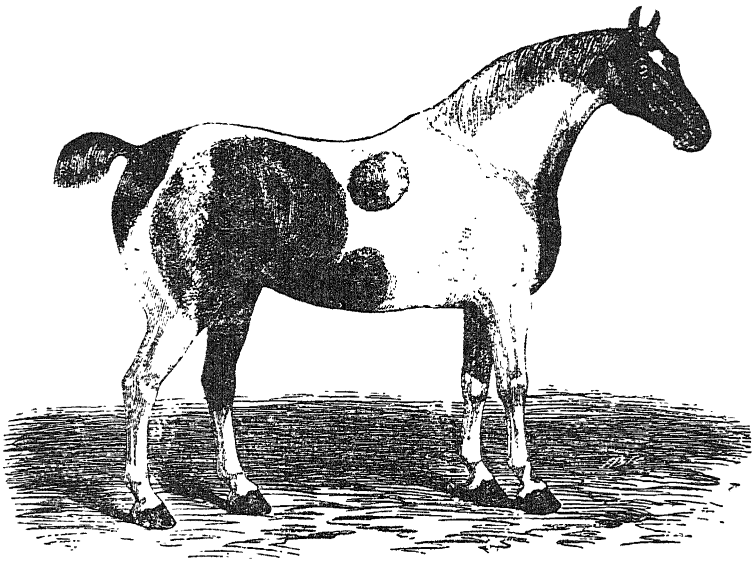
You very often hear of the great power and endurance of some ponies, and I have seen some which were reported to be wonders, but I have never owned one, nor been certain as to his capabilities, until lately. I now have a little Basuto pony, which, on the day that I made his acquaintance, had just completed 71 miles between early morning and night over a terribly hilly road. He was carrying 13st. 10lb., and his height is 12h. 3in. with shoes on. He was repeatedly doing journeys of 60 miles and back to a place where his owner, a Dutch farmer, kept his cattle, and this on no food, you may say, for his owner did not pretend to feed him, and the veld is as bare as your hand, for there has been a fearful drought this year until within the last fortnight. When I got him he was, as you may suppose, a little skeleton, but he is a good little bit of stuff. How such a child's pony, as we should consider him at home, could stay such distances under such weights, unfed, passes comprehension. On the day that he did the 71 miles he had only 6lb. of oats.



ANGORAS.

The Property of Mr. Scammel, South Australia.

Model Hackney.



HACKNEY MARE, MAGPIE.

This mare, whose picture appears in the *Live Stock Journal,* was the finest type of a hackney ever exhibited, and won more first prizes in saddle and harness than any other animal in England.

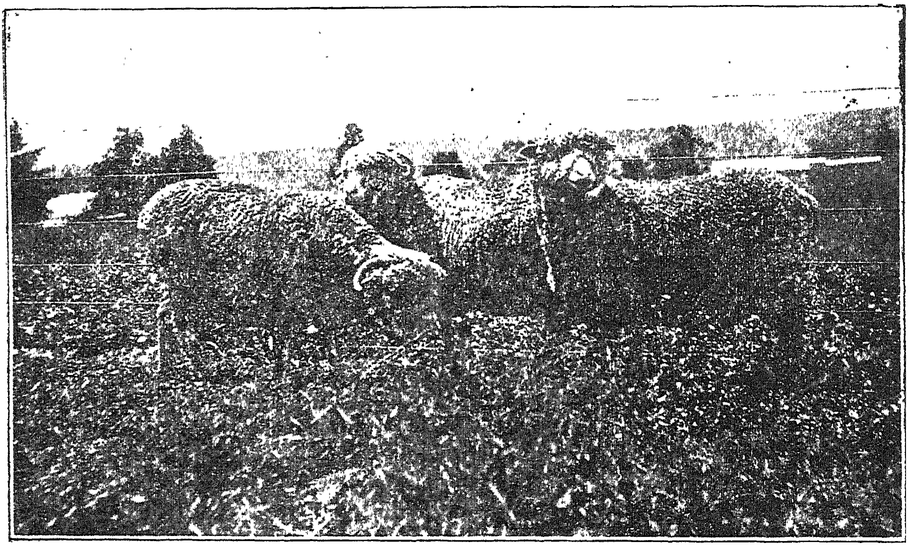
EDITOR.

Suitability of Rape for Sheep.

A writer in the *American Sheep Breeder* remarks:—

Sheep differ from all other animals in the fact that their woolly coat, weighing from 5 to 10 or even 15 per cent. of their other solid matter, contains a large amount of sulphur, or 4 per cent. on the average. That is, a fleece of a well-bred Rambouillet ram may have one full pound of sulphur in it, or half more in some of the heavier fleeces of this breed. Of course, everyone realizes the fact that whatever is in the fleece is derived from the food, for there is no other way possible. Then what will happen if the food does not contain this indispensable sulphur? There could be no wool, the animal would be simply bald or covered with very scant hair, if there be no sulphur in the feed. This is a fact we are to think of when preparing feed for our flocks. And when we find that rape largely excels in the quantity of sulphur in it, and equally excels in its quantity of potash (and the yolk of wool, which we all know is indispensable to the good condition and quality of the fleece, has about 90 per cent. of potash in its ash), we may be very sure that rape must be the very best of all feeds for sheep during the season in which it may be grown in the best manner.

Stud Merinoes.



GROUP OF STUD EWES.

We are indebted to Mr. G. Blaine, Kei Road, for a photograph of three of his stud ewes. The average fleece weight of 20 of these was ten pounds each exactly.

These sheep were not got up, but have been running in the veld subject to all weathers. We believe this flock has been bred largely in the Australian strain, and it is well known that their wool has won first and champion prizes.—EDITOR.

Utility of Mules.

The question of What's a mule fit for? is so often asked by farmers who have never used mules on their farms, preferring horses, that we shall give a few of the merits possessed by our long-eared friend.

The mule is an easy animal to raise.

He doesn't eat much as compared with a horse.

An energetic mule will make a trip quicker than a horse, though he may not go fast—the secret of his speed is his uniform gait, steady and persistent.

You hardly ever see a sick mule; he seems practically immune against diseases which attack horses.

A mule can endure more hardship than a horse, will pull more in proportion to his size, and will "stay with it" longer.

A mule is easier "broken" or trained to work than a horse, and is more reliable after having been initiated.

If a team of mules runs away they look out for themselves, and though they may make some close turns and go through a needle's eye, so to speak, they usually come out unharmed.

We would rather plough corn with a team of mules than with horses: they break down less corn and turn around quicker.

Hot weather affects the mule less than the horse.

A good, honest business mule is worth, and will command, a good price any day in the week.

The usefulness of a mule continues longer than that of a horse.

The mule is not handsome, doesn't make a good roadster, isn't stylish, doesn't "do himself proud" if hitched to a fancy yellow wagon or cart, but what he lacks in appearance he makes up in actual usefulness on the farm.—*Tennessee Farmer.*

DAIRYING.

Milk Standards.

A great deal of discussion has taken place in England recently with respect to the standard of milk which the committee appointed to take evidence on the subject has recommended. The standard which the committee proposed was 12 per cent. of total solids, but they also recommend a limit of 3.25 per cent. of fat and 8 per cent. of non-fatty acids. In discussing this question, Mr. F. J. Lloyd says:—

"Whatever standard you adopt for pure milk, that must be the standard by which all adulteration is estimated. It is quite possible to admit of 'limits' for the constituent parts which may not together make up your standard, but you cannot adopt such limits also as standards. Where a sample falls below the limit, its deficiency must be estimated by your standard. If the Board of Agriculture fix limits then it is evident that a prosecution must follow whenever a sample falls below these limits, for the public analyst must report such a case, the prosecuting authority must take action, and, so far as I can see, the magistrate must convict. The loophole of escape would be conflicting evidence as to the accuracy of the analysis, and nothing could be less desired by all who have the welfare of the dairy industry at heart, and by analysts themselves, than this constant wrangling over results. If, on the other hand, the Board of Agriculture should define a standard, then it would leave the analyst, the prosecuting authority, and the magistrates

power to exercise their discretion when a sample fell below this standard, as to whether the deficiency were natural or due to adulteration. In the light of the evidence placed before the committee there is much to be said in favour of this course. An analyst receiving many samples of milk daily or weekly is the first to discover when exceptional causes of season or climatic conditions are affecting the milk supply, and in reporting upon such milks he can exercise discretion so long as he is not tied by 'limits.'

If, however, the Board of Agriculture decide upon a standard, and at the same time on fixing limits for samples that fall below the standard, it is to be hoped that they will realise the essential difference between the two. How can we ever hope to prevent adulteration if the lowest limit of genuine milk is taken as the standard? It would necessitate prosecutions for two or three per cent. of added water, when the samples really contained six or seven per cent., and the fines which would probably be inflicted would do little to check the wilful and constant adulteration of milk, which after all is the object to be attacked.

Personally, I am in favour of a standard of 12 per cent. total solids containing not less than three per cent. of fat. Samples which fell below this standard would be either poor milk or adulterated milk. Thus a certain amount of discretion would be allowed to analysts in reporting on, and to magistrates in convicting for the sale of such milk. If one-tenth the fat had been removed the sample would contain only 2.70 per cent. of fat, or if five per cent. of water had been added there would be only 8.55 of non-fatty solids. If the Board of Agriculture decided on fixing limits as well as the standard, then the following would, in my opinion, be desirable: fat 2.75 per cent. and non-fatty solids 8.60. Prosecution would necessarily follow when the sample fell below either of these limits. In such case, however, the prosecution would have to be for at least 10 per cent. of fat removed, or for at least 5 per cent. of added water, and magistrates knowing that every chance had been given to protect the honest dealer would feel justified in inflicting such penalties as would soon put a stop to wilful adulteration."

Further, "Merlin," in the *Field*, offers the following suggestions in order to ensure safety in the sale of milk:—

1. The systematic testing of the quality of the milk of the cows.
2. The replacing of cows which produce milk below the standard by selected cows giving milk of high quality.
3. Testing of the quality of the bulk of the milk morning and evening before despatch.
4. Stripping the cows.
5. Taking the fore milk of poor milkers, and having the remainder for sale until these animals are disposed of.
6. Systematic preparation of the ration in accordance with recognised principles.
7. A diminution of the length of time between the evening's and the morning's milking.—EDITOR.

Unprofitable Dairy Cows.

In countries where dairying is an important branch of farming and source of national income, there have of late years been some careful investigations as to the most profitable methods to be adopted and the yield of cows individually. In this all-important element of the business, tests have resulted in surprising many owners of cows in showing both the inferior yield of some and the better yield of others, quite different to what they expected, and too often some cows do not pay for their keep. As an example of the dairy stock of a country, the *Producer* gives the following quotation :—

"There are 11,000,000 butter cows in the United States producing 1,375,000,000 pounds of butter per year (says a writer in *Hoard's Dairyman*). This is at the rate of 125 lb. per year for every cow in the country. A cow, to pay for her food, should produce at least 200 pounds of butter per year. According to the above figures there must be millions of cows in the country that do not pay for their board, but go through the motions of making milk and butter only to bring their owner in a loss at the end of the year. How many readers are assisting to pay that board bill? And how long are they going to keep it up?"

The breed of the cow is all-important, no doubt, but still even of the same breed there are often great differences in their dairy value, and therefore to obtain a correct estimate there must be individual enquiry. For where this is not done, the unprofitable cows will escape discovery. It may be a little trouble, but an intelligent investigation of the yields and qualities of the milk of each cow will pay well.—EDITOR.

A Good Business Cow.

The cow in all civilised countries is always a boarder upon some person. She should be made to pay for her board at such remunerative rates as will leave a profit for the boarding-house keeper. If she fails in that, she should be made to render a service which she will not willingly contribute. Her carcase should be made into beef and her hide into leather. She should not be shyly sent to board upon some other unfortunate man. A cow with the business habits of keeping her accounts with the world paid up through the man who owns and feeds her is a good business cow. That is the kind of a cow I recommend. Her power of service will be indicated by certain external points. She should have a large, long udder, of elastic, fine quality; a mellow, moveable skin, covered with soft, silky hair; a long, large barrel, hooped with flat ribs, broad and wide apart; a broad loin, spreading out into broad, long hind quarters; an open twist, with rather thin hips, and a clean neck of symmetrical

length, carrying a clean-cut, fine face, with prominent eyes. A cow with these points has ability to serve a man well, if she gets a fair chance. That her calves may have powers equal to, or rather better than her own, care should be exercised in their breeding. The best blood of the breed adapted to the farmer's purpose should be used to enlarge, and not to lessen, the working capacity to be transmitted to her calves.

According to her nature as a milk giver, her feed should be adapted to the work she has to do. Success is not all with the cow, neither with the owner.

Breed is all right, but the cow which will produce the most butter from the investment of a given amount of money is the best animal for the butter maker. Because certain families of animals are most highly prized is because they have a distinctive faculty for production along a certain line. Don't let an individual of the herd go because she is not of a fashionable colour or stripe.—*Australian Farm.*

Holding Back Milk.

According to Professor Stewart, the following is the explanation why cows sometimes hold up or keep back their milk :—

The production of milk is due to a nervous action by which the glandular substance of the udder is broken down into milk whenever the cow is influenced by sufficient excitement of the right kind. It depends upon the structure and function of the udder just as much as the sections of other glands do, which we know are wholly subject to a set of nerves controlling this distinct function. The udder is not a mere vessel for holding milk that is supposed to be secreted continually and gathers in the udder, as one may suppose a constant dripping of any fluid would fill any other receptacle. On the contrary, it is a gland, made up of cellular substance, which grows by separation (from the blood) of the matter required. When it has attained maturity, or when the necessary nervous action occurs, it breaks down into a special product—milk.

Several experiments have been made with the udder of cows in milking condition that have been slaughtered, and an examination is recorded of the udder of a cow accidentally killed on the railway when going home to be milked, when she would have given the usual 10 quarts. The microscope showed the minute lobules of the tissues swollen and distended, but the udder contained practically no milk, except a very small quantity that drained from the divided tissue when cut across. Let us consider what happens when we sit down to milk a cow. The milker gently rubs the udder and gently handles the teats, and this excites the maternal instinct. There is what is called an erectile action of the muscles of the milk organs. The previously soft and loose condition of the teats change to

rigidity, and in a very short time the milk flows, and continues until the glandular tissue is exhausted, when the udder, previously hard and tense, becomes soft and loose.

We perceive that this function of the cow is wholly nervous in its action, as, indeed, every other function of the animal is, and if the due nervous excitement is absent there is no functional action. It is wholly due to the right influence on the nerves that the milk is produced and flows from every ultimate lobule of the udder down through all the ducts, small and great, to the teat. Then, if all goes well, and the cow is in her natural, easily excited, nervous condition, as soon as the milker begins to touch the teats the cow lets down the milk—that is, she does not exert herself to oppose the action of the nerves of the mammary glands. But let the milker be rough or ill-use the cow, or let the cow from any cause be stupid and wilful, and this necessary motherly influence on the nerves be prevented in any way, and there is no milk. The udder may remain as tense and full apparently as usual, but not a drop of milk can be drawn until the current of the cow's mind is turned successfully to maternal desire.

Cheese Curing.

Dr. Babcock of Wisconsin, the inventor of the widely used Babcock Test, at the recent meeting of the Wisconsin Dairymen's Association, described his discovery of a new agency in cheese curing and presented tangible evidence to the assembled throng. Briefly stated by the *Breeders' Gazette*, the new discovery is this:

In 1897, working in company with Prof. Russell, Dr. Babcock discovered that normal milk contained an inherent ferment which tends slowly to digest it. This ferment is named galactase. The announcement of this, coming from so eminent an authority as Dr. Babcock, caused a sensation in the scientific world, and work was immediately commenced in many countries along the lines laid down. Dr. Freudenreich, of Berne, Switzerland, has, among the European scientific men, done perhaps the most extended work of research and experiment in connection with this new ferment, and his results bear out in every particular the statements made by Dr. Babcock. The galactase is similar to the pancreatic secretions of the stomach, and the important conclusion reached by Dr. Babcock is that it acts continually on the casein in curd, transforming it by degrees from an indigestible to a digestible substance. Formerly it was held that the work of bacteria caused the ripening of cheese. The new discovery entirely upsets that theory. Further experimentation then developed the fact that the action of the galactase did not cease under temperature as low as the freezing point and even lower, but at the freezing point the action of cheese bacteria ceases and in time

the bacteria die. These facts being taken in conjunction, it was determined to test the ripening of cheese in refrigerators, and, at the meeting above alluded to, Dr. Babcock presented samples of eight-months-old cheese subjected while ripening to temperatures not higher than 40° Fahr. These cheeses were of the finest texture, were free from holes and had no mould on the exterior surfaces. Moreover, the cheese itself was so "broken down" as to be almost in a condition to be spread like butter on ordinary bread. Hundreds of people present at the meeting tested the cheese in all possible ways, and under every test results were the most satisfactory. Dr. R. A. Pearson, assistant chief of the Dairy Department of the Department of Agriculture at Washington, Prof. J. A. Ruddick, assistant dairy commissioner of Canada, J. H. Monrad of Illinois and others participated in testing the cheese. Dr. Pearson declared that the discovery presaged the opening up of a new era in cheese making. A large Chicago dealer who was present was so charmed with the saleable qualities of the samples of cheese offered that he announced his intention of immediately equipping refrigerators where the entire output of some good cheese factory can be ripened after the new fashion.

There seems to be no flaw in the process as it has been tested. There is little doubt that the new product, on account of its product, on account of its superior healthfulness, more attractive appearance and immeasurably greater digestibility, will soon take a leading position in the world's trade in cheese.—*Pacific Rural Press.*

ENTOMOLOGY.

Locust Extermination.

(Continued from page 716.)

Buenos Aires, April 12th, 1899.

The President,

The foregoing report of the Director of the Entomological Department, Mr. Julio Künckel d'Herculais, replies to the note of the Central Commission, dated 3rd February this year. The said note merely reiterates that of November 12th, 1898, and requests an early reply to same.

The note of the Commission dated 12th November, after analyzing the report of Mr. d'Herculais (dated October 26th, 1898), states that "nothing is elucidated respecting the essential object for which the

Director was requested to travel over the places invaded, etc," and terminates requesting an amplification of said report "presenting in concrete the ideas suggested by the two journeys already undertaken, respecting the best means to be adopted to combat the flying locust, or in its stage of incubation, or the jumping locust, and to add anything new to those methods already known and advised by the Commission."

Intending, probably, to reply to this part of the note of the Commission, Mr. d'Herculais, after minutely repeating the negotiations resulting in his contract with the Argentine Government, states (pages 4-5): "I became assured that they had already put into practice nearly all the methods prescribed in my works for the destruction of locusts except (he says) the use of the apparatus Carcaraña, which was copied from North America." I must bring to the President's notice the fact that the above report of Mr. d'Herculais contains some incorrect assertions, which this General Inspection must correct, at least in so far as this General Inspection is concerned.

Respecting the methods advised and adopted by the Commission for fighting the locusts, they differ as to the scientific principles from the method and procedure detailed, as also from the advice given in Mr. d'Herculais' publications, and far from being copied from Mr. d'Herculais, or from North America, many of them are the direct result of observations by people of the country, who, left to their own devices in years past, adopted means of destruction essentially crude or primitive, but which by practice have been perfected from day to day. From the elaboration of these old methods, conveniently perfected; from the studies and observations made by the Central Commission on the development, migrations and habits of the locusts; from the patient and methodical trial of all that was adaptable to the country of the methods of Engineer Brown in Cyprus, of Riley in the United States of America, of Mr. Künckel d'Herculais in Algeria, and even from the antiquated Law VI. (Method of procedure for the destruction of locusts at the expense of the owners of property) dictated by Philip V. on the 11th September, 1723; have been evolved the methods, essentially national, advised by the Central Commission in their instructions, which being submitted for Mr. d'Herculais' examination, merely required his observations as to its construction.

A short comparative analysis will demonstrate some of the differences between the methods of the Commission and those of Mr. d'Herculais: (1st) Flying Locusts—(*a*) The Central Committee advises the destruction of the locusts at this stage, based on the multiple power of spawning observed here before Mr. d'Herculais arrived.

(*b*) Mr. d'Herculais does not advise the destruction of the flying locusts.

(2nd) Spawn.—(*a*) The Central Commission advises the destruction of spawn, and proclaims methods not mentioned in Mr. d'Herculais' publications, such as asphyxia by deeply trenching the earth, by

treading with cattle the layers of eggs after rains, by sediment produced by artificial inundations, etc., etc.

(*b*) Mr. d'Herculais abandoned in Algeria the combat against spawn, as shown by the following paragraphs taken from his publications: "Science even criticises the collecting of observations, and experiments have taught us many actions very important in demonstrating that very frequently the eggs perish in masses under the influence of natural causes very much more powerful than anything that could be substituted. It is to be feared that the collecting of locusts in certain cases causes work to be undertaken opposed to natural causes, or which, at least, disturbs the nominal propagation of the parasites, animal or vegetable. (Künckel d'Herculais, Assistant of the Museum of Natural History of Paris. Report of the Mission in Algeria.)

"For this reason, in Algeria this method of destruction has been generally abandoned, the chief reason being that besides the work of excavating, it entails great fatigue to the workers before the decisive moment of the struggle."

Our experiences, Mr. President, have shown us that the natural causes alluded to have not, up to the present, been sufficient to arrest the danger which crops were exposed to from the germination, either amongst or near them, of the great proportion of the spawn not destroyed by those natural causes.

Had we followed this advice, we would have had to close the doors of exportation, and open those of misery and depopulation of the country; but in justice it must also be stated that the Central Commission did not slight nor ignore the scientific observations of the French expert, and have advised, for preference, the adoption of modes which, while preventing the small larvæ of the locusts from rising to the surface of the soil, do not destroy the germs of parasites which the eggs might contain.

(3rd) Jumping Locusts.—The Central Commission recommends, besides the use of fire from straw or branches (which was used in Algeria,) fire with torches tarred, deep ploughing of land by night, so as to cover them with the earth; collecting boxes for use in vineyards; the taking advantage of droughts and other methods not mentioned in Mr. d'Herculais' publications.

This expert naturalist proclaims enthusiastically the use of "Cipriotas" or barriers made of stuff, assigning a second place to metal barriers. Our experience has induced us to give great preference to metal barriers, which are more durable, and can be used on any land, and with which can be combined the use of fire, which element constitutes a most powerful auxiliary; these having been used here to destroy columns several leagues in extent, and which is not mentioned amongst the methods used in Algeria.

The metal barriers, the proper placing of ditches, and their construction in such a manner as to prevent the jumping locusts from getting out (once having fallen in), were used here several years

before Mr. d'Herculais' publications were known, their use having been suggested by logical reason and experience.

Mr. d'Herculais states in his report (page 13) that notwithstanding his request for information respecting the march of invasions in previous years, he was thrown upon his own resources, because this information was not furnished to him. I must inform Mr. President that the Central Commission ordered the writer to furnish Mr. d'Herculais with any information he might require; and with this object, he was repeatedly invited to come, or send an official to the General Inspection Office to copy or extract the particulars or information desired from the registers and archives in this office, as this Department could not give away those elements of its own studies, compiled patiently and methodically by its Staff. This opportunity of easily obtaining reliable official information was not availed of by the Director of the Entomological Office.

Lastly, through the courtesy of the presidency of the Commission, Mr. d'Herculais sent daily to obtain information, received by the Committee, regarding the movements of the locusts.

The General Inspection delivered daily a true copy of the advices (notices) received, as long as they were sent for, but after a month the messenger of the Entomological Section charged with this duty ceased coming to this office. Furthermore, it appears from the books of this department that the Entomological Department received from the General Inspection, from the beginning of October up to date, 140 packets containing locusts' eggs of various derivations, and 9 boxes of diseased locusts. Each sample was accompanied by full particulars regarding its derivation, date of spawn, date upon which gathered, etc., etc.

Analyzing now that part of the report which might be called scientific or experimental, this General Inspection would make the following observations:—

(1) The details given by Mr. d'Herculais regarding the habitual routes of the invasions of locusts are not new, and are incomplete, and partly incorrect. These routes are noted in the report of this General Inspection regarding the invasion of 1897, in which will be found a minute description, and drawings in the annexed maps of the lines followed by the locusts on their march of invasion and departure. For the tracing of these lines, not only was the information gathered by the Central Commission taken into account, but also that referring to previous years furnished by Dr. Faustino Alsina and Mr. J. G. Manrique, President and Secretary respectively of the Commission of the Province of Buenos Aires, created by resolution of that Government, and which was in force a year before the creation of the National Commission.

(2) The remarks regarding the inability to submerge or wet the eggs, and the resistance to putrefaction of the frothy substance covering them, absolutely lack anything of novelty. These conditions, which Mr. d'Herculais alleges (p. 23) to have discovered, are well known, even to the most ignorant agriculturists of the country. They

have also been previously established by various authorities such as Riley, Weyembergh, Burmeister, and others, and have also been divulged in various publications in this country before the arrival of the French expert. (Stuart Pennington, "The Argentine Locust," 1897, page 23; Lawrence Bruner, "First Report of the Commercial Commission of Buenos Aires," March 1898, pages 12 and 24; Conil, "Bulletin of the National Academy of Science of the Argentine Republic, volume III.")

(3) The observations referring to the destructive power of the "champi" are deficient and contradictory. In one part it states that the "champi" does not destroy eggs, because it does not "eat them," while in another part it is stated that it destroys them by bringing them to the surface, where they "dry up, or rot." It is possible that the fully grown "champi" may, but exceptionally, eat the eggs of locusts. But that the larva of that insect, after coming out of the eggs, which the mothers, for preference, bury in the locusts' spawn, eats the eggs of the locust and develops upon them, is a fact which has escaped the notice of Mr. d'Herculais. A simple experiment would demonstrate this. In a crystal receptacle of one centimetre thick by ten centimetres wide and 15 centimetres long, place some slightly damp earth, pressed down. Enclose some locusts in the spawning stage, also several specimens of "champi," also in the spawning stage. To effect this, the females should be buried. A few days afterwards, looking through the receptacle, the gradual development of the maggots or larvæ of the champi will be easily observed, and they will be seen devouring the locusts' eggs one by one. If one nest of eggs is not sufficient for its development, it forces its way through the earth until it finds another nest near.

(4) The extensive destructive power of the champi is attributed by Mr. d'Herculais, in my opinion incorrectly, to some small insects, which he classifies indistinctly as *Gamasidæ* and mites.

The action of these parasites with regard to locusts has already been described by Riley, and has also been observed by the writer. From each of the specimens of locusts' eggs sent to the Entomological Office, some were reserved for the purpose of experiments recommended to this Office of Inspection. It is on the specimens that I have observed innumerable quantities of the mites mentioned by Mr. d'Herculais.

These mites attack the locusts' eggs, which have been released from their covering of earth, and preferably those which have begun to decay. All those nests of eggs which remained enclosed in clods of earth in their natural state, escaped the action of these parasites.

On my tours of inspection, I also noticed that where the locust spawn had been removed for destruction, the eggs rapidly became covered with mites, while those which remained undisturbed were not so. On the other hand, the existence of this parasite does not exclude the champi, whose destructive action is undeniable.

(5) The observations regarding the larva of the fly *Anthomyia* which destroys locusts' eggs, are not new. The Central Commission knew of them from the report of the General Inspection relating to the invasion of 1897 to 1898, besides which they are mentioned in the writings of various authors (Conil, Weyembergh, Stuart Pennington, Riley, etc.).

The same may be said of the flies which infest the body of the locusts with their larvæ, and to which Mr. d'Herculais attaches only secondary importance. These flies are so destructive to locusts, that in many specimens seven maggots have been found, and in some columns it has been found that 80 per cent. of the locusts were infected by the parasite. These particulars have already been given in the report of the General Inspection before referred to.

(6) Based upon a series of well-founded scientific experiments, Mr. d'Herculais endeavours to demonstrate that the locust in its various stages of development has an easy means of ridding itself of parasitic organisms, which conclusion, together with its accompanying considerations, tend to prove the futility of trying to find any practical method for the extensive destruction of locusts by means of infection by inferior parasitic organisms. The writer's experiences refer exclusively to the infection of the locust in its larval (jumping) stage, without taking into account that the infection of the flying locust, *which undergoes no changes*, may perhaps, by reason of the diffusion of infectious germs, be of greater importance than the contamination of the jumping locust.

On the possibility of this infection of the flying locust Mr. d'Herculais does not appear to have experimented, nor does he offer any opinion. His conclusions, founded on deductions of scientific logic, without having entered the field of experiment, and referring to only one stage in the life of the locust, may be put down as incomplete.

For these reasons, and that being, in my opinion, the only new point contained in his report, I think, Mr. President, that it would be advisable to publish the report of Mr. d'Herculais, not for the purpose of "safeguarding his proprietary rights," which, although perhaps of personal interest to that gentleman, are of no importance to the country, but with the object of provoking argument, and possibly of elucidating a most important problem, now that the whole country has fixed its attention, and founded its hopes on a method which, in spite of the pessimistic statements of Mr. d'Herculais, have given practical results at the Cape (South Africa), and have been even the subject of experiments here, the results of which, although limited, and of little satisfaction in their extensive application, have led to conclusions entirely distinct from those arrived at by the distinguished French expert.

(Signed) CARLOS FRERS.

Extinction of the Locust.

Possibility of the Propagation of Fungus Epidemic, with results, by José Gregorio Manrique, Ex-Secretary of the Central Commission for Extinction of Locusts.

Necessity for more effective methods than those actually employed. —Up to the present, the only methods employed in this country for destroying locusts have been empirical schemes by persons who have served their apprenticeship, maintaining without aid the struggle against the insect, before the authorities stepped in as they have now done. Other proceedings, principally applied, are those originated in Cyprus, which were also adopted in Algeria, and to which have been added the schemes of technical persons, who, little by little, have founded the Central Commission.

All these methods, barriers, cipriotas, torches, trenching the ground, etc., have had only practical results, not equal to actual necessity, and may generally be considered other than economical, on account of the great amount of labour, and consequent loss of force, which they require.

Considering the destruction of locusts as a public work, the struggle has to be carried on under the disadvantages inherent to the vast extent of territory subject to the invasion, the meagre population, the want of suitable elements to direct operations, and apply, with accuracy, the delicate prescriptions of such an enacting law as that in force, the want of resource of the majority of those required to comply with the law, and the many difficulties of properly selecting and organizing the personal elements needed to carry out the important duties.

These and other circumstances combine to make more onerous for the agriculturist, the workers against the plague, representing a serious obstacle to the industry, also being prejudicial to the country's interests, by reason of the labour and capital diverted to this purpose, to the detriment of other more fruitful works.

Notwithstanding the inconveniences named, great benefits have been obtained, saving hundreds of millions from ruin, the loss of which would have represented an abnormal taxation on the country. A great national work has been done, considering the disposition of the labours undertaken and the observations gathered, which justly may be considered satisfactory to our national patriotism.

The satisfaction is all the greater when it is remembered that the work carried out has been done exclusively by elements belonging to and having their roots in this country, extraneous factors having participated in either the scientific or practical direction, a circumstance which we mention, not that we would disparage foreign elements, which would be contrary to our ideas, but rather, for the greater satisfaction which the achievement produces in our national spirit.

In spite of the benefits derived, it is evident that more effective measures are required to relieve from anxiety those whose energy and capital are directed to rural industries—of vital importance to

our national progress, more especially agriculture, which is exposed to the ruinous attacks of the locust.

These effective measures of salvation and security for agriculture can only be obtained by methodical application of the knowledge obtained from the various campaigns instituted against the locusts which knowledge, in conjunction with scientific methods, which are not new to us, will yield better results, with greater economy of labour and money.

PROPAGATION OF EPIDEMICS.

The various methods of propagating epidemics, which, with some result, have been put in practice to combat agricultural plagues, impress upon the mind the belief that similar results would be obtained by applying the same methods to the destruction of locusts. This belief is greater, and becomes conviction, when some of the experiments are known which have been made for the artificial propagation of fungus disease amongst the columns of locusts, and the causes rendering their efficacy difficult are compared with the peculiarities of the insect favourable to that end.

The diseases originated by the presence of fungus entomophytes,* which develop in the locusts, undermining and destroying their organism, are propagated one to another, when the conditions of the atmosphere are propitious, and the dry bodies of the insects cause the germs of the fungus, scattered by the wind, to germinate in the bodies of other locusts, or in ground prepared, which become death-bearing belts to the swarms. The entomophyte fungi require for their development certain warm and damp conditions of the atmosphere. The attempts to propagate in the locusts those most suited to that insect have encountered the difficulty that it is necessary that the swarms should remain in a climate suitable for their development, which is considered difficult, or impossible to obtain, owing to the essentially mobile character of the locust.

This difficulty, considered unsolvable, serves as the basis of argument to those who question the efficacy of the method. The existence of these difficulties, which has retarded the application of such a valuable economic and probably decisive method for the extinction of locusts, arises, in our judgment, from deficient observations of the migratory evolutions of the insect, and probably from an erroneous appreciation of the climatic conditions required by them which, according to those evolutions and other phenomena, appear to be analogous with those required for the propagation of the fungus.

The knowledge of this fact, and of the migratory evolutions under which locusts favour the development of fungus epidemics, would lead us to the solution of the question of the propagation of the latter with good results. But as we cannot advance so rapidly, it would be dangerous in our present experiences. Let us approach this assump-

*Literally, "insect plants," or fungi found on insects.

tion with the object only of lending our humble contribution of study towards the elucidation of so interesting a subject, asking indulgence for any defect in our labours.

Observations and Experiments.

In the United States and in the Argentine Republic, and probably in other parts, there exist regions in which fungus is found, naturally fatal to locusts, and which ravages the columns entering upon them. Cases are also cited, which have occurred in Algeria, Natal and the Argentine Republic, in which the artificial propagation of fungus epidemics in locusts have proved effective among columns otherwise free from disease, when they have encountered the warm and damp climate of regions favourable to the developing of the fungus causing the disease.

The Fungus in South Africa.

In South Africa they have arrived at interesting conclusions. Dr. Sinclair Black, Assistant Medical Officer, Robben Island, the author of a complete study of the morphology of the Cape Fungus or *Empusa acridii*, finds that the fungus develops readily under artificial cultivation, and produces immense quantities of germs, which, on coming into contact with locusts, immediately germinate and penetrate the skins, rapidly undermining the fatty and organic substances.

The practical experiments of infecting locusts with the *Empusa acridii* were done under the direction of Mr. Cooper, delegated by the Natal Government, who arrived at the following conclusions: —

1st, That the fungus disease known as *Empusa acridii* arises among the locusts, develops in them in epidemic form, and appears as natural to the country.

2nd, That this disease is fatal to the locusts in all stages of their metamorphosis, excepting in the egg stage.

3rd, That the fungus is easily cultivated artificially in considerable quantities, and is communicated artificially to the locusts.

4th, That if the locusts are attacked by this disease, in the nature of the fungus, it proves fatal.

5th, That it does not produce any bad effects on plants or meadows, and it is probable that by this means the dissemination of the fungus is obtained.

These experiments make no mention of any influence that the fungus might have on domestic animals, and on this point Dr. Frederick Wagner, ex-chief of the Entre-Rios Section, observes, with reason, that they do not produce any perceptible prejudicial symptoms in them, because it would be strange that in a country so essentially practical, this important point of the question should have been forgotten.

Fungus of the Cape and Carcarañá.

Dr. Wagner, who has made some experiments, has proved the inability to inoculate domestic fowls with this fungus, or the

Argentine fungus or carcaraña. His experiments have assured him that carcaraña works with equal effect on the flying as on the jumping locusts, and requires for its development a certain degree of moisture or humidity, its action being arrested by dry and hot weather, but without in any way affecting its vitality.

The results obtained by Dr. Wagner tended to incline him to favour the Cape fungus, the action of which was more rapid, and as being less sensitive to the effect of heat and drought. This opinion he placed in direct opposition to that of other persons who had experimented with the same fungus, and encountered the explanation of this difference in the possible use of dead cultures, a circumstance which he had occasion to notice in some experiments.

The object of this article not being to study the greater or less efficacy of the various fungi, we will not enter into the subject. Sufficient for our purpose being the acknowledgment of the efficacy of the method of destruction we have been treating, and to determine the causes which oppose its application, and which can be overcome, as will be seen later on.

(*To be continued.*)

Destruction of Locusts at Graaff-Reinet.

In his last quarterly report on the Botanic Gardens at Graaff-Reinet the Curator observes respecting the ravage of locusts :—

"I regret to have to report the damage done to plants, flowers, &c., by the swarms of locusts, which raided the gardens in millions for about a fortnight.

They seem to clear everything before them, especially the lawn, which they completely cleared in one day, and it is now in a condition that will take some months to pull round. The orange trees have also suffered from them, they eating the bark right off. I also had some nice beds of young cabbage, lettuce and onion plants, most of which were ordered. To try and save these, I covered them with nets, but in less than three hours they had eaten the nets clean away. I sprayed them with American climax and strong tobacco water, but this was of no use. I then sprayed them with hot cyanide of potassium and soap, 2 oz. of cyanide of potassium and 1lb. of soap to the gallon; this was very effective, not one escaping that was touched with it. This I consider the best spraying mixture to use; it is sure death to them and does not harm plants in the least, in fact it does the plants good by killing all the fly and scale on them, thus killing two birds with one stone.

But I could not proceed far with this for a garden of this size, as it was too expensive.

But another remedy, and perhaps the most deadly, to the locust is the locust disease fungus, which I used with good results and for which I am much indebted to Mr. Roe, who supplied me with several tubes of this. After having used it a few days, swarms of locusts

were to be seen dead under the trees and bushes. These are readily devoured by the others, they contract the disease, and so it goes on dealing destruction amongst them. I used this fungus in the following manner:—

Take some very dry white bread, grind it to a coarse powder, place a cupful of this into a bowl, add water enough to make a watery paste, in this put the contents of one tube of fungus, stand in a moist warm atmosphere, until the fungus grows all over the top of the paste, which takes from two to three days, then put it down in the run of the locusts or where there are swarms; they devour it greedily and the work is done. I feel sure if this fungus was used more generally, especially among persons with large gardens, we should soon have no more of these pests to contend with."

MISCELLANEOUS.

Sheep and Goatskins of Spain.

Sheepskins.

Several kinds of sheep are bred in Spain, but the most valuable, on account of the excellent quality of the skins, are those found in the provinces of Murcia and Catalonia and in the district known as La Mancha, in New Castille; also those in the province of Estremadura, which, however, are esteemed more for their fine wool than for the pelt.

It is a notable fact that the finer the wool the poorer is the skin for tanning purposes. It is in Estremadura that the celebrated Merino sheep are bred. Merino wool was at one time considered the finest obtainable in Europe, but, like many other natural sources of wealth in Spain, sheep farming has suffered from lack of enterprise and energy. Spanish sheep are white, excepting those of La Mancha, which are black.

Sheep are classified under the heads of lambs and sheep or ewes. Until the animal is one year old it is sold as a lamb. The skin of the lamb is used for making gloves, and is classified into "firsts" and "seconds," according to the fineness of the grain and the number of defects in the skin. The skin of the Estremadura sheep is unsuitable for gloves, and can only be used for inferior articles.

In Milan and St. Julien in France, in Yeovil in England, and also in several parts of Germany there are large tanneries devoted to the preparation of the skins exported from Murcia, Catalonia and

La Mancha. These tanneries, either directly or through commission firms, send a large proportion of their output to the United States, which is an important market for glove skins.

When the animal is more fully grown its skin can no longer be used for making gloves, and it is then applied to the manufacture of fancy goods, bookbinding, etc. Sheepskins are prepared in two ways; when tanned with sumac they are used for making cigar cases, pocketbooks, purses, etc., but when required for leggings, aprons used by agricultural labourers, harness, or anything that must be subjected to wear and tear, the skins are oak tanned. The former—*i.e.*, those prepared with sumac—are extensively exported from Spain to Germany, whereas the latter find, or used to find, a good market in Cuba, Porto Rico and the Philippines.

The manner in which the skin is removed from the carcase is as follows:—A small hole is made in one of the hind legs of the animal; a strong pair of bellows is then inserted into this little aperture, and air is blown in until the carcase is well swollen. The belly is then slit open from end to end and the skin is carefully removed, if necessary with the help of a knife.

The skins are collected by men who devote themselves exclusively to this work. After being exposed to the sun until a slight crust is formed on the flesh side, they are stretched on ropes in the shade until completely dried, and are then ready for export.

Goatskins.

These are produced in large quantities in the vicinity of Badajoz and generally in all the south of Spain. The skin of the very young kid is used only for ladies' fine gloves and is prepared principally at Annonay and Grenoble, in France. These skins also find a market in the United States in a prepared state; but with this sole exception the entire supply of Spanish kid and goatskins is exported in the raw state to the United States for tanning into fine shoe leather, etc. This trade appears to be in the hands of French commission merchants.

The business is done here by direct contracts with the butchers and also with sundry "collectors." These go round regularly to all the villages and bring the skins to the dealers in the towns. In order to preserve the skins from damage by moths in summer, dealers use powdered naphthalene, which they sprinkle over them while they are being stacked. For export the skins are baled in small presses. —*Rural World*..

Tomatoes on Trellis.

Tomatoes in the open are grown in various ways, but one of the methods that we have tried, in which stakes were used in trellis form, produced such good results that it is worth a notice. In all, six stakes were used in upright form, and two others cross-wise, one being tied across the front of the stakes at the top, and the other about 10in. from the ground, so that it received some support from the tops of the pots in which the plants were raised. The plants were set about 4 feet from each other, and three or four side growths were allowed to develop and were duly trained to the stakes. The main stem was not trained in an upright form, but was made to form curves first to the left, then to the right, and so on. By this method of training the whole of the six upright stakes were covered, and the plants produced a large yield of fine fruits. Let us point out that we found one or two things essential to utilize this plan with the best results. For instance, as there was more growth than is usually allowed when the plants are confined—as we generally advise—to one stem, more time was needed to ensure ripe fruit. As the season during which they can be ripened is short, this has to be studied, and early outdoor planting becomes a necessity. In our case we grew the plants under the protection of a fence. Then, as the position was a south one, we had no difficulty with the crop. If, on the other hand, the ordinary system of planting out is adopted, there will not be time as a rule to ripen the crop, and in our opinion it is useless growing tomatoes if they cannot be coloured. Then, again, the plants need bringing on earlier, so that when set out early they are well advanced. If these little things are seen to there will be no difficulty in readers doing as we did, that is, obtaining a hundred and more fine fruits from each plant. Where wall or fence space can be utilized the crop will pay well. The system of culture is simple, the aim being to fill by training all the available space, and as the growth is kept to the surface of the trellis and is thin the plants get the full benefit of the sun heat, and will send out the most fruitful growth. We have stated that we grew the plants in pots. We did this because it induces sturdy, fruitful growth. The stem growth becomes more firm, and in preventing too great a succulency of stem and leaf with tomatoes, we improve the fruit-bearing properties of the plant or vine. We always think that we can regulate the supply of moisture and plant food too by the use of pots*; that is the chief reason why we like to have them. We have put the number of the fruits grown under this method at a low estimate. It is quite possible to obtain as many as 200 fruits from one vine trained in this form; that is, 200 fruits on the vine at the same time. If we can only get plants to crop like this it stands to reason that it will pay, provided of course that the fruits are well

* Tins in this country.—ED.

coloured. With regard to feeding, give no stable manure, except mixed with loam that has been piled, as we always advise. Then only use this material as a top dressing, and not until the fruits begin to set and swell. It is, of course, at this period that the greatest strain is made upon the plants, and so long as ample nutriment is available, there will be no trouble in obtaining large fruits. We would point out that where stable manure is fed liberally to the plants in the early stages free leaf growth is secured. This, together with an excessive development of stem, is productive of trouble later on, for it causes a reckless expenditure of vital force, and vital force should always be conserved as much as possible, for it is the basis of all life. Then, if we have an excessive production of vine growth this necessitates greater attention and labour than will otherwise be the case when the plant is fed in a reasonable manner and its growth kept in check by judicious cultural treatment. Whatever material is used for potting, none will be found better than old decayed turfy loam. As we have pointed out before, it contains all the virtue that is needed to bring the crop to perfection. Now let us look at the matter of fruiting from another standpoint. The great aim of the grower of tomatoes, particularly on the trellis system we are dealing with, should be to obtain a cluster of fruit as low down on the stem as possible. We have seen scores of plants which had no fruit on the stem lower than 3ft. This is poor practice. Under good treatment, and chiefly by the use of the potting material we advise, the plants ought to be induced to start fruiting 10 in. or 1 ft. from the surface of the soil at most. When this is done it means that clusters will be obtained all over the trellis, in ample time to stop growth, and ripen a full crop. We cannot impress the fact too much upon growers that, though the plant is a gross feeder, plant food should be restricted until the fruits call for ample supplies of it. It will be seen by many that a good deal depends upon the treatment that is meted out to the seedlings from the start, for often the plants are allowed to grow as they please, and, being raised closely together, they become weak and long, and then it is difficult, and often impossible, to get the plants to start fruiting low down on the stems. It is here that the great value of the loam comes in, and ensures just the kind of growth that is wanted under good culture. We have stated that the plants should be set out in the open earlier than usual under the ordinary method. If this is done, it will allow of the plant having ample time for development, and also allow plenty of time for hardening off. The one thing here should be to secure slow growth, the development of thick stems, and then the seedlings will show themselves to be just the kind of plants that is desired. The system we have outlined will be found most advantageous when put into practice. It will certainly enable the grower to bring on a large crop of the best fruits, and by the aid of the warm fence behind the trellis the specimens of tomatoes can be coloured up well. As the pots ensure free drainage, the conditions generally are most favourable for the production of choice tomatoes in the open.

—*Fruit-grower.*

Raisin Culture in California.

The appended article on the above subject appeared in a January number of the *Scientific American* :—

"The city of Fresno, California, with a normal population of 20,000, contains in the season 45,000, all working from daylight to dark, engaged in cutting, drying, packing and shipping the crop of raisins. The soil, combined with certain essential climatic peculiarities, makes the region particularly adapted to the growth of the native grape. For eight months of the year rain never falls. The warmth of the soil absorbed in this long period of sunshine imparts to the fruit that excess of saccharine quality which it requires, while the curing and drying of the grapes in the fields is permitted by the prolonged heat. Added to these advantages is an inexhaustible supply of water, for irrigating, drawn from the high Sierras, under the perfect control of the vineyardist, and rendering him independent of drought or abbreviated rainfall at all times.

The raisin industry up to within twenty-five years was a monopoly of southern Europe, and the chief dependence of a great population. That in so brief a period this important industry could be transplanted to distant California, and the methods of Spanish cultivators improved in such a measure as to displace foreign importations altogether, is another miracle of American enterprise. Spain has still the advantage of cheap labour.

The cultivation of the raisin grape is a process of ceaseless industry and never-failing vigilance, the fruit of minute observation and scientific experiment. Beginning in early winter, the vines are pruned close to the ground, and each succeeding month, up to the 1st of June, finds the growers industriously engaged in cultivating, sulphuring, and pruning again, with the object of protecting the vines from the attacks of insects or rust and of getting out of the soil and forcing into the maturing fruit the greatest nourishment without at the same time exhausting or weakening the vines. Superfluous bunches are cut off. The size and not the number of these is the aim of the most successful grower.

The climatic conditions in the raisin district are of the utmost importance to the successful prosecution of the industry. The season's rainfall in Fresno averages about 8in., beginning in November and terminating in May. But the growers here are entirely independent of nature's supply of moisture. The varieties of grapes chiefly planted are the Muscatel de Gordo Blanco, Muscat of Alexandria, Sultana, and Thompson's Seedless. It takes on an average 3½lb. of green grapes to make one of raisins. The yield per acre is about five tons of green or one and a quarter of the dried fruit.

The average amount of sugar in the raisin grape is from 25 to 28 per cent., depending upon soil, season, and amount of water supplied. Vines are planted eight and ten feet apart, and closer when the richness of the soil admits.

The season's gather of the grape begins the latter part of August. There are 42,000 acres of vines in Fresno County, and one man to the acre is the rule. The clusters are handled by the stems alone, as contact with the hands robs the product of its sightliness. As fast as picked the grapes are deposited in trays 2ft. by 3ft. in size, holding about 20 pounds. These trays are laid between the vines, sloping toward the sun. Here they lie for six or eight days, when they are turned over by the simple process of placing one tray on top and reversing. The sun-curing takes altogether from ten to twelve days, when the grapes are taken to the packing-house to endure the sweating process. The sweat boxes are somewhat larger than the trays, and 8in. deep. The sun-dried grapes are transferred to these boxes, a sheet of paper being laid upon the bottom and a layer of grapes placed on this, paper and grapes alternating until the box is full. The loaded sweat boxes are then carried to the equalising room, a dark, air-tight apartment, well ventilated; the boxes are piled on top of each other, and remain for fifteen or twenty days until thoroughly sweated.

In this process the moisture in the raisin is evenly diffused; when the product emerges it is about ready for market. In handling, much fruit falls from the dried stems and is marketed as "loose." These are put in a "stemmer," where they are divested of the stems and mechanically sorted into four grades. The bunch raisins are generally packed in twenty-pound boxes. This is a careful operation, and is generally entrusted to women and girls.

Within the past three or four years a new product known as the California seeded or stoned raisin has been put upon the market, and has rapidly attained popularity among consumers for its many obvious merits.

In 1896 the stoned raisin was put upon the market. The raisins are prepared for seeding by first being subjected to a drying temperature of 140deg. for five hours, immediately after which the fruit is submitted to a chilling process, and while in this condition is passed through a cleaning and brushing machine, which removes absolutely every particle of dirt, including the cap stems. It is then taken to a room and spread out on wire trays in a temperature of 130deg., which brings the fruit back to its normal condition. In this process the berry is converted into pectin, that delicious jelly which gives to fruit its best flavour.

The raisins being thus submitted to alternate heating and chilling are prepared to endure all climatic influences and to keep indefinitely. They are then passed through the seeding machines, which have a capacity of from 10 to 12 tons daily. In the operations, raisins are pressed between rubber-surfaced rollers, which at first flatten the berry and press the seeds to the surface, when an impaling roller catches the seed between the needles and teeth affixed to its periphery and removes them from the fruit, which passes on, minus only the seed. The product is then packed in one-pound paper boxes, and afterward in packages containing thirty-six, convenient

for marketing. The extraction of the seeds leaves the fruit intact, without mutilation. It is expected that Fresno will ship this year 2,500 cartloads of raisins alone."

Total Production of Wine in 1900.

The *Moniteur Vinicole* estimates the total production of wine last year at 3,600,000,000 gallons, of which 40 per cent. was made in France, 18 per cent. in Italy, and 13 per cent. in Spain. The French wine crop, including Algeria and Tunis, is given at 1,642,000,000 gallons, that of Italy at 596,250,000 gallons, that of Spain at 528,750,000 gallons, and that of Portugal at 141,750,000 gallons.

The returns alone of the vintage of France for 1900, not including Algeria and Corsica, are extraordinarily large. A greater quantity of wine was made than was the case in the abundant year of 1875, the total yield being 1,515 million gallons, or nearly 500 million gallons in excess of the average for the previous ten years. The acreage planted in vines was only about 80,000 acres more than in 1899, so that the average yield was something like 360 gallons per acre, compared with 247 gallons in 1898, whilst the entire vintage is valued at £50,570,000.—EDITOR.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Rluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..
(Inspector's signature)..
(Address)..
Date....................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices to date, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896, 30th September, 1897, 27th October, 1898, 13th April and 6th July, 1899.

List of Fertilizers.

Attwell & Co.,	Special Root Guano ..	£6	10	0	per ton of 2,000 lb.
Cape Town.	Potato and Grain Guano ..	8	5	0	,, ,,
(Agents for Alex.	Nitrate of Soda	12	0	0	,, ,,
Cross & Sons, Ltd.,	Superphosphates 39/40 per cent..	6	0	0	,, ,,
Glasgow.)	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town.)				
De Waal & Co.,	Jadoo Fibre	0	10	6	per bale of 112 lb.
Cape Town.	Jadoo Liquid	0	2	6	per gallon.
Jas. Flower & Sons,	Economical Bone Fertilizer ..	8	10	0	per ton of 2,000 lb.
Cape Town.	Bone Meal	8	10	0	,, ,,
	(Prices free on trucks, Cape Town.)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphate ...	5	5	0	,, ,,
(Containing 26 per cent. Tribasic Phosphate of Lime.)					
	No. 2 Superphosphate	5	15	0	,, ,,
(Containing 30 per cent. Tribasic Phosphate of Lime.)					
	No. 3 Superphosphate	6	7	6	,, ,,
(Containing 37 per cent. Tribasic Phosphate of Lime.)					
	Vine Fertilizer	10	0	0	,, ,,
	(Prices free on trucks, Cape Town.)				
White, Ryan & Co.,	Potato Manure	8	10	0	,, ,,
Cape Town.	Grain or Cereal Manure ..	7	0	0	,, ,,
	Tree and Vine Manure ..	6	10	0	,, ,,
	Pure Bone Meal	6	10	0	,, ,,
(Prices free on trucks at Woodstock Station.)					
Odam's Manure &	Odam's "Complete" Fertilizer..	9	0	0	per ton.
Chemical Co.,	Odam's Vine Fertilizer ..	8	0	0	,, ,,
Port Elizabeth.	Odam's Vitriolized Bones ..	8	0	0	,, ,,
White, Ryan & Co., Cape Town.	Odam's Cereal Fertilizer ...	8	10	0	,, ,,
(Prices free on trucks at Cape Town or Port Elizabeth.)					
Woodhead, Plant & Co., Cape Town	Thomas' Phosphate Powder (Basic Slag)...	£4	5	0	per ton of 2,000 lb.
	Kainit	5	5	0	,, ,,
	Sulphate of Potash	16	0	0	,, ,,
	Muriate of Potash	16	0	0	,, ,,
	Superphosphates	5	5	0	,, ,,
	Nitrate of Soda	14	10	0	,, ,,
	Sulphate of Ammonia	1	2	6	per 100 lb.
	Vineyard Manure	1	15	0	per 112 lb.
	Tobacco Manure	1	15	0	per 200 lb.
Government Guano:—					
	Ordinary Guano	6	10	0	per ton of 2,000 lb.
	or	0	13	0	per bag of 200 lb.
	Rock Guano	6	17	0	per ton of 2,000 lb.
	or	0	13	9	per bag of 200 lb.

For use within the limits of the Colony.
Price includes delivery at Cape Town Railway Station.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		5 10 0	to	5 15 0
LINSEED CAKES.				
London made	ex mill	7 15 0	,,	8 0 0
American, in bags	ex dock	6 12 6	,,	7 0 0
Russian, in bags	,,	7 5 0	,,	7 10 0
Calcutta cakes		7 10 0	,,	7 15 0
COTTONSEED CAKES.				
London made	ex mill	4 15 0	,,	4 17 6
Egyptian, in bags	ex dock	4 11 3	,,	4 12 6
Decorticated	,,	6 0 0	,,	6 7 6
Meal	,,	5 15 0	,,	6 0 0
RAPE CAKES.				
East Indian Seed	ex mill	4 10 0	,,	—
MAIZE.				
Germ meal (American)		—	,,	4 15 0
,, ,, (English)	ex mill	4 12 6	,,	4 15 0
RICE MEAL.				
Rangoon	ex dock	4 2 6	,,	4 5 0
May-June shipment	ex ship	3 15 0	,,	—
MANURES—				
Nitrate of soda		8 10 0	,,	8 12 6
Bone meal		4 0 0	,,	4 5 0
Kainit, 23 per cent. phosphate of lime		2 10 0	,,	2 15 0
Basic slag, 35 per cent. phosphate	nominal	—		—
Superphosphate, 25 per cent. soluble		2 12 0	,,	2 15 0
,, guaranteed 34 per cent. soluble phosphate		3 1 0	,,	3 5 0

Mark Lane Express, April 22nd, 1901.

AMERICAN PRICES per ton of 2,000 lb.

		£ s. d.		£ s. d.
Bran, 1st quality		3 15 0	to	4 7 6
Linseed cake		5 4 2	,,	5 8 4
Cottonseed cake meal, 60 lb.	nominal	—		—
Mealies, per bushel 60 lb.		0 2 0	,,	0 2 2
Feed barley, 50 lb.		0 2 1	,,	0 2 4
Clover seed, per lb.		—		0 0 6
MANURES—				
Ground Bones, per ton		3 12 0	,,	3 15 0
Kainit, per ton		1 19 0	,,	2 0 0
Florida Rock Phosphate, per ton		2 0 0	,,	2 1 0
Sulphate of Ammonia, per 100 lb.		—	,,	0 11 8
Nitrate of Soda, per 100 lb.		0 7 3	,,	0 7 9
Muriate of Potash, per 100 lb.		0 7 6	,,	0 7 9

New York Weekly Journal of Commerce, April 15th, 1901.

Indwe Native Agricultural Society.

The Secretary of this Society has written to say that at a meeting held on the 17th inst., at Indwe, it was decided that holding the show be left over until next season. This was by request of the Natives themselves.

RAINFALL, APRIL, 1901.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory (a) 12 inch gauge	0·75
Do. (b) 8 inch gauge	
Do. (c) 8 inch gauge on roof	
Cape Town, Fire Station	1·02
Do. South African College	1·50
Do Sea Point (Falmouth Villa)	0·51
Do. Sea Point (Roseby)	
Do. Molteno Reservoir	1·18
Do. Platteklip	2·11
Do. Signal Hill	0·65
Table Mountain, Disa Head	
Do. Kasteel's Poort	3·25
Do. Waai Kopje	3·15
Do. St. Michael's	3·27
Devil's Peak, Block House	3·11
Do. Nursery Gauge	3·02
Do. Lower Gauge	2·68
Rondebosch	1·72
Newlands (Montebello)	n.r.
Bishop's Court	1·20
Claremont	0·90
Do. (Oaklands)	
Kenilworth	0·84
Wynberg (St. Alban's)	
Do. (St. Mary's)	0·84
Groot Constantia	1·27
Tokai	1·31
Simon's Town (Wood)	1·16
Do. (Gaol)	1·15
Blaauwberg Strand	n.r.
Robben Island	0·40
Strandfontein	n.r.
Camp's Bay	1·23
Mouille Point	
Fish Hoek	0·64
Cape Point	0·33
Smith's Farm	1·00
Durbanville	1·53
II. SOUTH-WEST:	
Langebaan (Saldanha Bay)	
Eerste River	0·98
Klapmuts	1·58
Stellenbosch (Gaol)	1·08
Do (Experimental Farm)	
Somerset West	0·85
Paarl	2·40
Wellington (Gaol)	0·98
Do. (Huguenot Seminary)	0·94
Delta	
Tulbagh	0·68
Kluitjes Kraal	0·89

II. SOUTH-WEST—*continued.*	INCHES.
Houw Hoek	
Ceres	1·64
Rocklands	n.r.
Caledon	0·90
Do. (Gordon)	
Worcester (Gaol)	0·41
Do. (Meiring)	n.r.
Hex River	0·98
Lady Grey (Div Robertson)	0·09
Robertson	0·57
Do. (Govt. Plantation)	0·34
Ashton	
Montagu	0·00
De Hoop (Div. Robertson)	0·85
The Oaks	1·61
Rawsonville	0·77
Weltevreden	0·93
Danger Point	0·86
III. WEST COAST:	
Port Nolloth	0·00
Do. (Howard)	n.r.
Klipfontein	0·00
Kraaifontein	0·00
O'okiep	0·06
Springbokfontein (Gaol)	0·27
Concordia	0·03
Garies	0·00
Kersefontein	n.r.
The Towers	0·86
Dassen Island	0·50
Malmesbury	0·63
Piquetberg	1·08
Van Rhynsdorp	0·38
Clanwilliam (Gaol)	0·26
Do. (Seydell)	0·31
Welbedacht	0·68
Hopefield	0·62
Lilyfontein	0·00
Zoutpan	0·68
Anenous	0·01
Wupperthal	0·94
IV. SOUTH COAST:	
Cape L'Agulhas	0·83
Bredasdorp	0·48
Swellendam	0·85
Heidelberg	0·74
Riversdale	1·16
Herbertsdale	n.r.
Geelbeks Vlei	0·90
Mossel Bay	0·82
George	2·11
Ezelzagt	n.r.
Millwood	3·27
Sour Flats	2·25

IV. SOUTH COAST:—*continued.*	INCHES.
Concordia	3·02
Knysna	1·87
Buffels Nek	2·52
Harkerville	2·03
Plettenberg Bay	1·62
Forest Hall	2·29
Blaauwkrantz	2·26
Storm's River	n.r.
Witte Els Bosch	2·30
Humansdorp	2·33
Cape St. Francis	1·62
Hankey	1·92
Witteklip	4·06
Van Staadens (upper)	2·92
Do. (lower)	3·56
Uitenhage	1·33
Do. (Inggs)	n.r.
Dunbrody	n.r.
Port Elizabeth (Harbour)	1·92
Walmer Heights (near Port Elizabeth)	2·87
Tankatara	1·63
Lottering	n.r.
Shark's River (Nursery)	n.r.
Do (Convict Station)	2·16
Grootvader's Bosch	2·35
Karnmelks River	0·76
Armadale	2·09
Vogel Vlei	0·49
Great Brak River	1·40
Melkhoutfontein	0·64
V. SOUTHERN KARROO:	
Touws River	0·31
Ladismith	1·36
Amalienstein	1·07
Calitzdorp	1·75
Oudtshoorn	2·02
Vlakte Plaats	n.r.
Uniondale	1·54
Kleinpoort	n.r.
Glenconnor	1·40
VI. WEST CENTRAL KARROO:	
Matjesfontein	n.r.
Prince Albert Road	n.r.
Fraserburg Road	n.r.
Prince Albert	0·95
Zwartberg Pass	3·00
Beaufort West	2·54
Dunedin	n.r.
Nel's Poort	n.r.
Camfer's Kraal	1·65
Lower Nel's Poort	2·34
Baaken's Rug	1·53
Willowmore	1·24
Steytlerville	n.r.
Roosplaats	1·17
VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	0·93
Do. (Bedford)	1·22
Aberdeen Road	1·31
Rietfontein	1·25
Winterhoek	n.r.

VII. E. C. KARROO:—*continued.*	INCHES.
Klipdrift, De Erf	n.r.
Kendrew	1·76
Graaff-Reinet	1·16
Do. (College)	1·12
New Bethesda	1·62
Roode Bloem	0·96
Wellwood	n.r.
Do. Mountain	n.r.
Jansenville	n.r.
Patrysfontein	n.r.
Toegedacht	0·98
Klipfontein	1·43
Cranemere	0·77
Pearston	1·03
Fredenberg	
Somerset East	2·99
Do. (College)	3·19
Longhope	2·18
Middleton	n.r.
Corndale (Div. of Aberdeen)	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n.r.
Middlewater	1·76
Darlington	n.r.
Bloemhof	1·63
Arundale	1·31
Glenharry	0·99
Roode Hoogte	0·29
VIII. NORTHERN KARROO:	
Calvinia	n.r.
Middelpost	n.r.
Sutherland	2·47
Rheboksfontein	n.r.
Fraserburg	1·33
Onderste Doorns	n.r.
Droogefontein	1·62
Gannapan	0·36
Carnarvon	1·29
Wagenaar's Kraal	1·40
Brakfontein	n.r.
Vogelstruisfontein	n.r.
Victoria West	1·33
Britstown	1·60
Murraysburg	1·32
De Kruis	1·47
Richmond	2·12
De Aar	n.r.
Middlemont	1·08
Hanover	1·48
Philip's Town	1·80
Boschfontein	2·24
Petrusville	n.r.
The Willows	n.r.
Naauwpoort	1·33
Middelburg (Begley)	1·25
Colesberg	2·28
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	n.r.
Stonehills	1·20
Cradock	1·61
Do. (Rose)	1·52
Varsch Vlei	0·96
Witmoss	n.r.
Steynsburg	4·28

VIII. N. KARROO—*continued*.	INCHES.
Steynsburg (Nesemann)	4·36
Daggaboer's Nek	n.r.
Quagga's Kerk	n.r.
Tarkastad	1·34
Drummond Park	n.r.
Riet Vlei	1·71
Brand Vlei	
Williston	
Omdraai's Vlei	0·57
Zwagersfontein	n.r.
Varken's Kop	1·40
Culmstock	n.r.
Doorskuilen	n r.
Houwater Dam	n.r.
Hillmoor	2·20
Glen Roy	3·29
Fish River	n.r.
Spitzkop	2·12
Phizantefontein	2·02
Biesjesdam	n.r.
Kleinhaasfontein	1·78
Schoombie	0·73
Beyersfontein	1·07
Zeekoegat	0·71

NORTHERN BORDER:	
Pella	n.r.
Kenhardt	0·30
Van Wyk's Vlei	n.r.
Prieska	1·91
Dunmurry	0·81
Griqua Town	2·01
Campbell	1·64
Douglas	2·57
Avoca (Herbert)	1·65
Eskdale	1·05
Hope Town	0·90
Orange River	n.r.
Newlands (Div. Barkly West)	1·44
Groot Boetsap	n.r.
Kimberley (Gaol)	1 97
Do. (Stephens)	2·54
Bellsbank (Div. Barkly West)	1·70
Grootdrink	
Barkly West	2·29
Upington	0·08
Trooilapspan	n.r.
Rutland	1·94
The Halt	0·28
New Year's Kraal	2·63

X. SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	
Fairholt	3·60
Cheviot Fells (Bedford)	n.r.
Alicedale	n.r.
Bedford (Gaol)	2·16
Do. (Hall)	n.r.
Sydney's Hope	2·33
Cullendale	n.r.
Adelaide	2·73
Atherstone	2·34
A'exandria	1·54
Salem	2·66

X. SOUTH-EAST:—*continued*.	INCHES.
Graham's Town (Gaol)	2·59
Do. (Bact. Inst.)	2·36
Heatherton Towers (near Graham's Town)	1·68
Fort Beaufort	2·11
Katberg	n.r.
Balfour	3·15
Seymour	2 69
Glencairn	2·74
Alice	2·09
Lovedale	n.r.
Port Alfred	n.r.
Hogsback	n.r.
Thaba N'doda	
Peddie	2·26
Cathcart	3·92
Keiskama Hoek	2·48
Dynamite	1.67
Thomas River	n.r.
King William's Town	1·86
Do. Hospital	2·17
Stutterheim (Wylde)	3·44
Do. (Beste)	3·34
Dohne	n.r.
Kubusie	n.r.
Blaney	n.r.
Kei Road	n.r.
Evelyn Valley	
Berlin	n.r.
Isidenge	n.r.
Pirie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	n.r.
Komgha	n.r.
Prospect Farm (Div. Komgha)	3·57
East London, West	n.r.
East London, East	n.r.
Fountain Head	
Fort Cunynghame	n.r.
Katberg Sanatorium	3·11
Cuylerville	n.r.
Bolo	3·65
Fort Fordyce	n.r.
Forest Bourne	3·78
Melrose	1·75
Sunnyside	1·95
Vischgat	2·31
Scott's Bottom	2·35

XI. NORTH-EAST:	
Venterstad	n.r.
Ellesmere	1·73
Burnley, Cyphergat	2·06
Burghersdorp	1·84
Burghersdorp (Le Roex)	1·69
Molteno Station	n.r.
Cyphergat	2·83
Thibet Park	1·98
Sterkstroom	2·97
Sterkstroom (Veitch)	n.r.
Rocklands	1·35
Aliwal North (Gaol)	1·33
Aliwal North (Brown)	1 51
Rietfontein	

XI. NORTH-EAST—*continued.*	INCHES.
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	2·93
Jamestown	n.r.
Queenstown (Gaol)	3·08
Queenstown (Beswick)	2·86
Dordrecht	2·52
Tylden	n.r.
Snow Hill	n.r.
Herschel	3·46
Lady Grey	2·89
Bolotwa, Contest	1·92
Lady Frere	1·27
Avoca (Div. Barkly East)	n.r.
Keilands	2·61
Barkly East	2·57
Glenlyon	3·91
Gateshead	n.r.
Lyndene	2·24
Mooifontein	1·61
Poplar Grove	
Biesjesfontein	n.r.
Whittlesea	2·38
Doornkop	2·90
XII. KAFFRARIA:	
Slaate, Xalanga	2·36
Ida, Xalanga	3·24
Cala, Xalanga	1·34
Cofimvaba	n.r.
Nqamakwe	2·71
Main	1·52
Engcobo	n.r.
Butterworth	2·32
Kentani	3·10
Maclear	3·05
Idutywa	2·95
Willowvale	4·05
Mount Fletcher	1·81
Elliotdale	0 91
Mqanduli	2·49
Matatiele	n.r.
Umtata	1·30
Qumbu	1·37
Kokstad	0·62
Port St. John's	2·35
Umzimkulu	0·60
Woodcliff	n.r.
Tabankulu	n.r.
Kilrush	1·34
Somerville (Div. Tsolo)	2·14
Tsomo	1·36

XII. KAFFRARIA—*continued.*	INCHES.
Mount Ayliff	1·16
Seteba	1·28
Flagstaff	3·07
Bazeya	1·77
Qwebe	2·29
XIII. BASUTOLAND:	
Mafeteng	n.r.
Mohalie's Hoek	1·68
Qacha's Nek	1·63
Moyeni Quthing	3·61
Teyateyaneng	3·36
Leribe	n.r.
Butha Buthe	n.r.
Maseru	n.r.
XIV. ORANGE RIVER COLONY:	
Jacobsdal	
Philippolis	
Bethulie	2·61
Jagersfontein	
Bloemfontein	n.r.
Smithfield	n.r.
Wepener	
Kroonstad	
Fauresmith	n.r
Frankfort	
Ladybrand	
XV. NATAL:	
Durban, Observatory	6·56
XVI. THE TRANSVAAL:	
Johannesburg	4·28
Do. Cemetery	3·97
Doornfontein	3·18
Bremersdorp, Swaziland	
XVII. BECHUANALAND:	
Vryburg	n.r.
Maritzani	
Mafeking	
Taungs	2·95
Doornbult	
Morokwen	
XVIII. RHODESIA:	
Salisbury	0·94
Hope Fountain	2·69
Geelong	
Matopa Dam	

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 18th May, 1901, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Allwal North ...	0 10 6	0 18 0	0 18 0	0 10 0	0 11 6	0 12 0	0 15 0	0 10 6	0 18 0	0 1 3	0 0 9	0 0 9	0 2 6	0 5 0	£15 to £18	18/- to 19/-
Beaufort West ..	0 13 6	0 19 0	0 13 6	0 13 6	...	0 14 0	0 15 0	0 12 6	1 0 0	0 1 0	0 0 8	0 0 7	0 2 0	0 3 0	£10 to £15	20/ to 22/6
Burghersdorp ..	0 11 0	...	0 13 6	0 10 6	...	0 12 3	...	0 10 0	0 7 6	0 2 6	0 0 9	0 0 7	0 1 4	0 3 6	...	...
Cape Town ...	0 10 6	0 12 6	0 10 9	0 8 0	...	0 9 0	0 10 8	0 13 0	0 18 0	0 0 5¼	0 0 7	0 0 7½	0 1 6	0 3 0	17 0 0	1 4 0
Clanwilliam ..	0 11 0	0 17 6	0 13 0	0 8 0	0 11 0	0 8 0	0 12 0	0 9 6	1 4 0	0 1 4	0 0 7	0 0 6	0 1 6	0 1 3	11 0 0	0 18 0
Colesberg ...	0 12 0	...	0 13 6	0 11 6	...	0 14 0	...	0 11 6	0 17 6	...	0 0 5½	0 0 6	0 1 7	0 3 3	...	...
Cradock ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graaff-Reinet ...	0 12 6	0 18 0	0 14 0	0 12 6	...	0 12 6	0 17 0	0 12 6	0 13 0	0 1 9	0 0 8	0 0 7	0 1 6	0 4 0	£12 to £15	22/6 to 25/-
Graham's Town ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kimberley ...	0 14 0	0 18 0	0 14 0	0 12 6	0 12 6	0 12 0	0 1 0	0 13 0	0 18 0	0 1 0	0 1 0	0 0 10	0 1 9	0 3 0	£15 to £18	18/- to 23/-
King Wm's Town	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Malmesbury ...	0 11 0	0 15 0	0 12 0	0 10 0	...	0 10 0	0 10 0	0 10 0	1 0 0	0 1 6	0 0 8	0 0 7	0 1 6	0 2 0	17 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 16 0	0 12 0	0 7 6	..	0 6 0	0 10 0	0 7 6	0 14 0	0 1 3	0 0 9	0 0 9	0 1 3	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Port Alfred	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
Port Elizabeth ...	0 10 6	...	...	0 9 6	...	0 8 0	...	0 9 0	1 1 0	0 0 8	...	...	0 1 9	0 3 0	..	..
Queen's Town ...	0 12 6	0 17 0	0 13 6	0 12 0	0 11 5	0 16 3	0 15 9	0 10 0	0 11 0	0 2 6	0 0 8	0 0 7	0 1 6	0 2 9	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18 6	1 3 6	0 18 0	0 15 0	0 15 0	...	0 18 6	0 18 0	0 16 0	0 2 0	0 0 9	0 0 9	0 2 3	0 3 3	...	...
Worcester ..	1 1 0	0 15 0	0 12 0	0 10 0	0 10 9	0 10 0	0 10 0	0 11 0	0 16 0	0 0 8	0 0 7	0 0 7	0 2 0	0 2 6	...	...

NOTE.—Returns have not been received from the Civil Commissioners of Cradock, Wodehouse, East London, Grahamstown, King Williamstown, Bathurst and Tarka.

THE

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AGRICULTURE.

Reports and Prospects.

Butterworth, *May 1st*.—The mealie and Kaffir corn crops are now fast ripening and reaping has begun in some portions of the district. Pasturage is abundant and luxuriant, and stock, with the exception of one or two cases of lung-sickness, are in excellent condition.

J. YOUNG, A.R.M.

East London.—Braakfontein, *May 1st.*—Winter is approaching, and already some rough and boisterous weather has been experienced. Mealies and Kaffir corn are being harvested and a very fair yield is assured. Where late, the crop is too far advanced to fear any serious losses from locusts, which are now strong on the wing and fairly numerous in parts. Small swarms here and there are to be found dead and dying, resulting probably from soap-spraying, as from examination I can trace no other cause. It is the large red-winged or coast locust that continues with us, the smaller or khaki as found further inland being entirely absent Some welcome showers have fallen during the month and pasturage is good and water plentiful. Stock are healthy and thriving. Ground is being got in order for wheat and oats, though of the former I am afraid but little will be cultivated owing to the destruction caused by rust.—W. R. Ellis. Ward 2, *May 4th.*—Prospects for the month of April were not encouraging, as oats sown in the early part of the month have developed rust, in some places very badly. Potatoes have also rust. Kaffir corn that was cut during the month is not so good as anticipated, but still there are good crops. Mealies that have been picked are of good quality. No wheat sown as yet. Seed very scarce. Cattle healthy. Veld good. No locusts in this Ward.—E. Holdstock. Ward 3, *May 1st.*—There appears to be a little uneasiness among fruit-growers owing to the threatened destruction of oranges and naartjes by the moth that proved extremely troublesome and destructive last season, and as there is no known means of successfully coping with the pest it may be assumed that there will be considerable loss. Guavas also are more or less damaged and fall to the ground before ripening. The fumigating plant is in almost constant use to keep the red scale under control; the operations have been successful and considered to be labour and money well spent, although it appears to be necessary to repeat the operation about every eight or nine months. Young locusts are to be met with in all directions, and several applications have been sent to the local Board for spraying material. However, there does not appear to be sufficient energy displayed for successful working, which may be attributed to the hope that they will die off as they did last year. Extensive preparations are being made for large sowings of Algerian oats, but wheat will scarcely be touched owing mainly to rust and blight. The veld is good and stock healthy.—T. Willows. Ward 6, *May 3rd.*—The prospects of all crops are good. Mealies, Kaffir corn and beans have now mostly been harvested. The veld is still good and stock are in good condition, but the disease, peeling of the skin, is still in some herds, though I think it is dying out now.—W. Kretzmann.

Elliot, *April 30th.*—The weather up to the present has been very mild; there has been no frost worth speaking of, hence the mealie crop is good. There has not been anything like sufficient rain yet to enable farmers to plough, but the veld is looking well, and there is

every prospect of a good winter. Large and small stock are in good condition and healthy. J. Cumming, R.M.

Elliotdale, *May 2nd.*—The Natives of this district during the past month have been busily engaged in reaping what has proved the heaviest harvest for years, more especially in the case of Kaffir corn. Moderate rains have fallen at intervals during the month and the veld is in excellent condition. The destruction of locusts by means of fungus supplied by the Government Bacteriological Institute at Grahamstown was very successful. No new cases of glanders have been reported and it seems as if the disease has been stamped out temporarily. W. Hargreaves, R.M.

Flagstaff, *May 2nd.*—A good deal of rain fell during the past month, and in parts the crops advancing towards maturity have been damaged by excessive moisture. Autumn is now fast setting in, but more warm weather will be necessary to prevent a premature harvest. Stock, large and small, are looking well and no diseases have been reported, except a few slight cases of what appeared to be mouth disease amongst horses, which yielded to treatment.
J. Rein, R.M.

Kentani, *May 1st.*—Very heavy rains fell during the past month. The crops suffered a little but not seriously from the excessive wet. The Kaffir corn crop now ripening is very good and abundant, but the mealie crop will not be large. The veld is splendid and stock are looking well. N. Thompson, R.M.

Libode, *May 1st.*—An early indication of the approaching winter was experienced at the commencement of the past month by the prevalence of extremely cold and dry weather intermingled with a few slight showers of rain. The crops of mealies and Kaffir corn are rapidly approaching maturity, and harvesting has already commenced in some parts of the district. An outbreak of redwater and lung-sickness was reported, and as the infected cattle were promptly quarantined I do not anticipate a spreading of these diseases in the district. A few cases of horse-sickness were also brought to notice and in two instances the disease proved fatal.
J. C. Garner, R.M.

Lusikisiki, *April 30th.*—The harvesting of the mealie and Kaffir corn crops has now become general and a fairly good yield is expected. Pasturage is beginning to assume a winter aspect, and stock-owners will shortly begin their customary trek coastwards. Passing showers have fallen lately but with no appreciable effect.
A. E. Gilfillan, A.R.M.

Nqamakwe, *April 30th.*—The rainfall for the past month is 2·71 inches. The veld is still looking well. The cattle and sheep are in fine condition. Two cases of lung-sickness have been reported. The Kaffir corn and mealie crops are fruitful in many parts of the

district and a few of the Natives have reaped a little. Many lands will come to nothing, owing to the seed having been sown very late.

R. MACLEOD, A.R.M.

Port St. John's, *May 1st.*—Reaping is now being carried on throughout almost the whole of the district, and the fine weather now prevailing is much assisting operations. Besides mealies and millet, there is a large quantity of sweet potatoes cultivated in certain parts, and this crop looks very healthy. Stock of all kinds are healthy and in good condition. W. J. TURNER, R.M.

Tabankulu, *April 30th.*—We have had several cold days and nights during the past month, and it is feared that frosts will be upon us before standing crops, which are very promising, have a chance of ripening. Pasturage is not as good as might be expected, but all stock are in good condition and free from disease.

R. H. WILSON, A.R.M.

Tsomo, *April 30th.*—The rainfall registered at this station for the month was 1·36 inches. Crops still continue to look well, and if frost keeps off, grain will ripen well. Stock are in good condition. No outbreak of disease has been reported. W. THOMPSON, R.M.

Pasture Grass (*Paspalum dilatatum*).

In continuation of the notice published in our last issue of *Paspalum dilatatum*, we now reproduce from the New South Wales *Agricultural Gazette* the following contribution by Mr. P. Quirk, manager of the Berry Stud Farm, N.S.W., on the cultivation of this pasture grass :—

"Now that the enormous extension of the dairying industry has made the sowing of artificial pastures so important a matter, and as the season for laying down permanent pastures is upon us, the subject is one that is discussed largely by the farmers, and information sought after. In travelling through the South Coast, one cannot help being struck very forcibly by the invariable remark by old residents and practical dairymen, "Our lands will not hold artificial grasses as they did years ago." The remark is only too true. Where at one time might be seen waving fields of rye-grass, cocksfoot and clovers, are now growing the unsightly and undesirable tussocks, and the low-lying fields are covered in many cases with what is commonly called water-couch or swamp-grass.

This is a bad state of affairs, and again only too apparent in such an important dairying district. The farmers are realising it from a financial standpoint; so we are looking around us for a new move. We have been told our lands require manuring. This is very well in theory, but will not suit the pockets of small farmers, who could not afford to use artificial manures on (say) from 100 to 150 acres—a big

item. Now I really think the salvation of the South Coast dairying industry lies in new grasses suitable to our lands, and believe the foremost of these is *Paspalum dilatatum*, one of the most valuable grasses ever introduced into Australia, which is the most prized grass on the northern rivers; but it is unfortunately a difficult one to raise from seed. It requires at least three weeks of warm, moist weather to germinate, but when you get *Paspalum dilatatum* you have it for all time. It shows up enormous quantities of feed during the hottest and driest weather; and now that our farmers freely admit rye-grass will die out after a few years, I strongly advise sowing a mixture of *Paspalum* with other seeds—say, about 1 to 1½ lb. per acre. The following should be a good mixture:—Rye-grass, perennial, 15 lb.; cocksfoot, 15 lb.; mixed English grasses, 2 lb.; Kentucky blue-grass, 3 lb.; clovers, mixed, 3 lb.; *Paspalum*, 1 to 1½ lb. This will make a good bottom for the first two years. After the rye-grass will start to die out in many places, the second year the fields should be allowed to seed if possible, so that the *Paspalum* will have an opportunity to distribute its seed, which is very light; in fact, it is blown a short distance by the wind and carried about by the stock and trampled into our loose soil. This is one of the main reasons why I advocate a small sowing to allow Nature to do its own work after the first sowing. This would not meet with the same results in hard clay lands where the surface soil is very hard, as found in many districts. By this method the farmer would have a field of *Paspalum* coming on when the other grasses are dying out.

Mr. O'Callaghan, Dairy Expert, procured from the Hawkesbury Agricultural College 200 roots of *Paspalum* and had them forwarded on to me at Stud Farm, Berry. They were planted on 5th October, 1900. The result is, the grass has grown 4 feet high, through a very unfavourable time; and as I wished to give them a severe test they were planted in light poor soil, which was too poor to grow broadcast maize planted alongside of it about the same time. Now, after five months' growth, the *Paspalum* is much higher than the maize, while the latter, at time of writing, is withered up on account of the dry weather, and all grasses also, except the *Paspalum*, which is green and flourishing, and the growth astounding. It was sown in drills 5 feet apart; it is now in seed, which will be harvested by cutting the heads off and the roots taken up and transplanted elsewhere. The seed is very hard to harvest, as it ripens irregularly and much of it sheds, which, when tramped into our loose soil by the stock, will germinate, as this is the best seed; and, in my opinion, why so small a percentage of it germinates is that the best seeds are left behind on the farm on which it was grown; hence it is hard to get good seeds on the market. The most reliable course to adopt for best results is by planting the roots. One root or bunch will make several settings, which can be obtained from many of the Government farms. In laying down a field with other grasses it would be a good idea to procure the roots and plant them, say, 6 feet apart both ways immediately after the grass has been sown; if allowed to seed the follow-

ing year they would distribute, in Nature's way, a great amount of seeds. Drills need not be drawn; roots could be planted with the hoe after the style of maize. Spring is the better time for planting the seeds, but out of season for sowing other grasses; and I have planted *Paspalum* seeds in March, last year, and had the satisfaction of it germinating; and in this district I would favour March sowing, as weeds do not grow so abundantly.

To point out the wisdom of sowing *Paspalum* with other grasses, I have conversed on the subject with many leading and enterprising dairy-farmers, and pointed out to them the advantages, with the result that they at once saw the advantage and purchased *Paspalum dilatatum* seed to sow with grasses they had ready to lay down in permanent pastures. Again, many visitors that call upon us at the Stud Farm with a view to inspecting the imported stock, are struck with the wonderful growth of the *Paspalum*, and always make the request to be allowed a handful of seeds for trial sowing on their own farms. This speaks volumes for it, and only requires to be brought before their notice and in a few short years we will see the now unsightly tussocks and swamp-grass ousted and our fields again waving with a permanent grass."

Agricultural Seeds.

Under the auspices of the Board of Agriculture a committee was appointed last summer to take into consideration the conditions under which agricultural seeds are at present sold, and to report whether any further measures can, with advantage, be taken to secure the maintenance of adequate standards of purity and germinating power.

The committee met on ten occasions and examined upwards of thirty witnesses, seed-merchants, farmers and scientific witnesses, including Mr. Carruthers, Mr. Gilchrist, Mr. Hall, Profs. T. Johnson, McAlpine and Somerville. The evidence of these witnesses is now published as a Blue-book, whilst the report of the committee is issued separately.

Taking the report first, the committee find that there is [now] no wide-spread complaint of the quality of seeds sold throughout the country. The committee, further, think that every encouragement should be given to seed merchants to give a guarantee with the seeds they sell, and that farmers should be advised to buy only subject to such guarantee and to test the seeds they have purchased. To facilitate this the committee recommend the establishment of one central seed-testing station under Government auspices, with the aid and counsel of a small committee of experts. The report is signed by all the members of the committee. Two of their number, Sir W. T. Thiselton-Dyer and Mr. Leonard G. Sutton, while agreeing generally with the findings of the committee, raise objections to the proposal to establish a Government seed-testing station.

It is satisfactory to hear that the general quality of the seeds sold has greatly improved of late years. This improvement is, no doubt, in great measure due to the passing of the Adulteration of Seeds Act, an Act, it may be pointed out, which was promoted by the seedsmen themselves, who desired to purify their business from seed-killing, seed-dyeing and other questionable practices which had been allowed to grow up to such an extent that it was difficult for a merchant to avoid conniving at, if not practising them.

At present, so far as the large firms are concerned, there is in general no question as to the excellence of the seeds they sell, and those who, like the writer of the present notice, have had the opportunity of witnessing the care taken in selecting the seed and in afterwards cleaning it and preparing it for market will corroborate this statement. With the smaller dealers, especially in some parts of Wales and Ireland, the case seems different. There the farmers often buy relatively small quantities of seeds of low quality and equally low price from local tradesmen, ironmongers, cornfactors and the like, who have no other knowledge of seeds than such as is necessary for securing the best means of disposing of them. It is especially for the protection of small, and often ignorant, farmers that the seed-testing station is intended.

All the large firms test their own seeds and the seeds they buy from the Continent or elsewhere. Moreover, they grow them in their own trial grounds. They do this on a very much larger scale than would be possible in a seed-testing station.

Some of the smaller firms, and perhaps some of the large houses also, occasionally make use of the seed-control stations at Zurich or Halle, and they find it a grievance that they have to send to Switzerland or Germany for information which obviously could as well be obtained here. Indeed, the botanists of the Royal Agricultural Society (Mr. Carruthers) and of the Highland and Agricultural Society of Scotland (Mr. McAlpine), and perhaps others, do undertake to test seeds for the members of their several societies, or under certain conditions, for outsiders.

These tests, wherever they be made, have reference to the "purity" of the seed, its germinating power and its "genuineness." By purity is meant freedom from seeds of weeds or other admixtures. The germinating power is tested by the percentage of seeds in any given sample which, under favourable conditions, is found to produce healthy seedlings. Theoretically a hundred per cent. should grow. In practice the percentage may, without fault of the seedsman, be, in certain cases, much below this, but it is satisfactory indeed when one thinks of the many contingencies to which the clover plant is subjected to find it to be quite common for 98 per cent. of the seed to grow. When one thinks of the humble bees, and the mice and the cats, and the vicissitudes of the climate, it seems remarkable that such a percentage of good seed should ever be obtained.

What seedsmen mean by the "genuineness" is another matter, but one of extreme importance. It would be quite impossible even for an

expert to recognise seed of a particular stock or breed, say of broccoli or turnip. There are good stocks and bad "stocks" of these, but they cannot be distinguished by their seeds. A mere seed-testing station, private or official, could render no assistance in such cases. The only way to test the genuineness of a stock is to grow it and watch it throughout the season. Obviously the purchaser could not wait for that, he must trust to the good faith and reputation of the seedsman.

Considering, then, the vast scale on which seed-testing and seed-trials are now made by the leading firms, and the limited scale on which seeds can be tested at a seed-testing station, and, further, bearing in mind that the ordinary seed-trials give no indication of "genuineness," we do not see that the farmer for his immediate practical purposes would be materially benefited by a seed-testing station. It would answer his purpose very much better to devote a little care to testing the seeds for himself from a sample procured some weeks before he required to sow for a crop. The seedsman, in his turn, should give a guarantee that the bulk should be equal, or closely approximate, to the sample. We say closely approximate, because so numerous and so varied are the vicissitudes to which the seed is, or may be, exposed that some latitude, say to 5 or even 10 per cent., would only be reasonable.

Farmers in general sow much too thickly, so that a lower percentage than is theoretically desirable might well be condoned in practice if the seed were good of its kind.

While saying so much we are far from wishing to undervalue the importance of research-stations wherein the phenomena of germination as well as other physiological and pathological processes might be studied from the point of view of research. Associated with a small trial-ground, such stations would be very valuable for the investigation of the properties and mode of life, not only of old well-known crops, but also of new introductions. It is just here that the value of the "crank of a scientific man" would show itself. One of the witnesses objected to placing such a man at the head of a Government seed-testing station because "they get so infallible and then they take notions in their heads."

It is as well to see ourselves as others see us. We should have thought infallibility in this connection was a sign of nescience rather than of science.

DR. MAXWELL T. MASTERS, in *Nature*.

Rust in Wheat and Other Cereals.

We have received a circular letter from Mr. Vilhelm Thiele addressed to "the farmers of South Africa" relative to rust in cereals and proposed remedy, in which he says:—

"On my trip to Denmark last year I visited farmers all over that country. It was just at harvest time, and it struck me that I did not notice rust or any other disease in any of the extensive corn-fields. On enquiry I found that all Danish farmers steep their grain seed in a Danish preparation called 'Ceres Beize,' highly recommended by the Danish Agricultural Society.

On my return here I was sorry to find that the crops of barley and oats on my farm at Wynberg Flats were completely spoilt by rust, and the same was the case all over here.

To prevent a recurrence of this mishap, I wired at once to Copenhagen for a supply of 'Ceres Beize,' to try the effect of it here.

A small consignment has now arrived by the *Raglan Castle*, and I shall be glad to supply farmers who wish to try it. Orders should be sent at once, as it is a very small quantity I have received, and I wish to have it distributed to as many farmers as possible to give it a fair trial.

Besides destroying the rust, it has not the same bad effect on the seed-grain as the bluestone and lime which have been formerly used; it is claimed for the 'Ceres Beize' that by using it the corn will grow better, and give more grain, the preparation being a good fertiliser. The 'Ceres Beize' will be sold this season in bottles containing 2lb. each, at 5s. per bottle. The contents of one bottle dissolved in water is sufficient to steep 700 lb. of wheat grain and 1,100 lb. of oats and barley. Directions for use will be sent with each bottle. When ordering, it should be mentioned whether the 'Ceres Beize' is to be used for wheat or for oats and barley, as there is a slight difference between the two preparations.

Johannadal, Wynberg." (Sd.) VILHELM THIELE.

Though no steeping or other preparation of seed grain has been found hitherto a protection against rust in cereals, we are glad Mr. Thiele has introduced this Danish remedy, and hope it will be extensively and carefully tried and found successful. For the losses occasioned by rust are of such a ruinous character, any remedy which is reputed to have been used successfully should have a fair trial, and at all events the country is obliged to Mr. Thiele for giving it the opportunity.—EDITOR.

Agricultural Publications of the United States.

The following statistics of the enormous work which the United States Department of Agriculture does for the farmer will afford an idea of the work involved in the publication and distribution of special reports and bulletins. In this connection our American cousins are far and away ahead of any other nation, although the Canadian Government is a very respectable runner-up.

The number of distinct publications and total numbers of copies printed each year since 1893 have been as follows :—

	Total number of	
	Distinct publications.	Copies printed.
Year.	No.	No.
1900	468	7,152,428
1899	603	7,075,975
1898	501	6,280,365
1897	424	6,541,210
1896	376	6,561,700
1895	254	4,100,660
1894	205	3,169,310
1893	2 0	2,689,084
Eight years	3,041	43,570,732
Average per year	380	5,446,341

These figures not only demonstrate the huge extent of the United States agricultural publishing business, but they show that there has been a marked growth in the popular demand for these publications, which are of the very highest class and value.

Respecting the 468 distinct publications in 1900, they contained not less than 17,999 pages, exclusive of maps and plates, thus giving an average of close on forty pages to each publication. For eight years over seven such publications have been issued in each week of six days. W.T.

Salt-Bush in California.

Mr. B Walton, of Compton, in writing to the *Californian Cultivator* remarks :—

"A few years ago this plant was introduced as a fodder plant to be grown on alkali land. Since that time it has spread out along the roads and on all kinds of lands, and is growing vigorously on the driest land, and I think promises to become a common weed. Will some of your readers be kind enough to inform our farmers what it is

good for? One of my neighbours had a patch, and the turkeys, chickens and his pig would eat it, but the cattle and horses would not. But the salt-bush has taken to the field and road-sides and bids fair to take possession. When it comes in contact with weeds or grass it just climbs over them, and I doubt if anything can stand against it. Perhaps the salt-bush would be like nearly all other kinds of weeds, including the common tumble weed, which when mown and shocked green and hauled out to stock on short pasturage in the fall of the year will be eaten clean."

STOCK FARMING.

Shorthorns.

Shorthorns are believed to be the most numerous and widely distributed English breed of cattle. They are great favourites not only in England, but in many other countries. In Ireland there are famous pedigree herds, and even in Scotland, with its famous native breeds, Shorthorns have established a footing and "Craikshanks" are getting well known over most parts of the pedigree cattle-breeding world. There are fine herds in Australia, and Argentina constantly imports pedigree cattle of this breed of the highest quality at high prices, and the country is getting stocked with large herds of well-bred Shorthorns. In the United States they have become quite a dominant breed, with old-established herds of pure-bred cattle and a general diffusion of the blood amongst the stock of the country.

Of late years, there have been established some strains of this breed which, though pure-bred, exhibit certain specialities. One of the most valuable of these are the milking Shorthorns. The establishment of this strain is not so much an attempt to engraft on the breed a valuable new quality but to restore an old and special one, for in the time of the Collings Brothers the Durham cattle, and especially the stock from which they produced the improved Shorthorns, were famous for their feats at the pail. This all-important quality succeeding breeders did not cultivate, and it unfortunately declined to some extent in the more important pedigree herds. However, the efforts which are being made by Mr. Stratton and others have been very successful, and there is every probability that there will be established a branch of this breed equally valuable for beef and milk and good for both.

The Lincoln Reds are another branch, they are not only all reds, but good hardy, thriving farmers' cattle, good for grazing and dairying, and they are much liked where known and bred.

Though not as yet very numerous, hornless pure-bred Shorthorns, or, as they are called, Polled Durhams, constitute a valuable variety of this breed, and being hornless they possess advantages especially as dairy cows. In fact, it is difficult to see what advantage or value horns are to cattle, or their owners, even in beef cattle, and therefore there is reason to think the hornless Shorthorns will be largely increased in future. There are some pedigree herds which have acquired position and name amongst cattle breeders, and constant efforts are made to keep up the full value and utility of the breed. Of the fine representative of this breed, in the accompanying illustration, we learn from the *Live Stock Journal* that the Shorthorn bull, Inspector, is a roan, calved April 23rd, 1897, and bred by Mr. A. Crombie, Woodend, Summerhill, Aberdeen, Scotland, and now the property of Mr. Vesey, Dunleckney Manor, Bagenalstown, Ireland. At the late Royal Dublin Society Show he was first in class 5 and won the Chaloner Plate. He is a bull of great size with excellent middle and fore-end.

One of the special qualities of Shorthorn bulls is their prepotency, and therefore their value as sires when used with ordinary dairy cows is shown in their progeny and the improvement of the herd.—EDITOR.

Prevention of Scab Better than Cure.

The General Secretary of the Ninth Annual Conference of Southern Branches of the South Australian Agricultural Bureau, held on March 22nd last, read the following :—

What a pity it is that we all do not recognise the eternal truths that are embodied in the proverbs, "Prevention is better than cure," and "A stitch in time saves nine." The losses and waste occasioned by various introduced pests could have been avoided by a vigilant attention to the first axiom, or a zealous enforcement of the second whenever it has been found that the enemy has gained an entrance, despite the precautions to exclude it. It may be a bold assertion to make, but careful thought will perhaps lead to the admission of its truth by a great majority of our agronomical population that the losses annually suffered by them through the ravages of introduced pests and diseases, and the absence of adequate preventive and early curative measures, amounts to quite 30 per cent. of their total income.

Locusts, although indigenous, could be dealt with, by united action, so that their mischievous ravages could be considerably minimised. In South Africa, where summer and autumn rains contribute a good deal of moisture to the air, a culture of a peculiar mould or fungus has been found to be effective; but whenever the atmosphere is dry,

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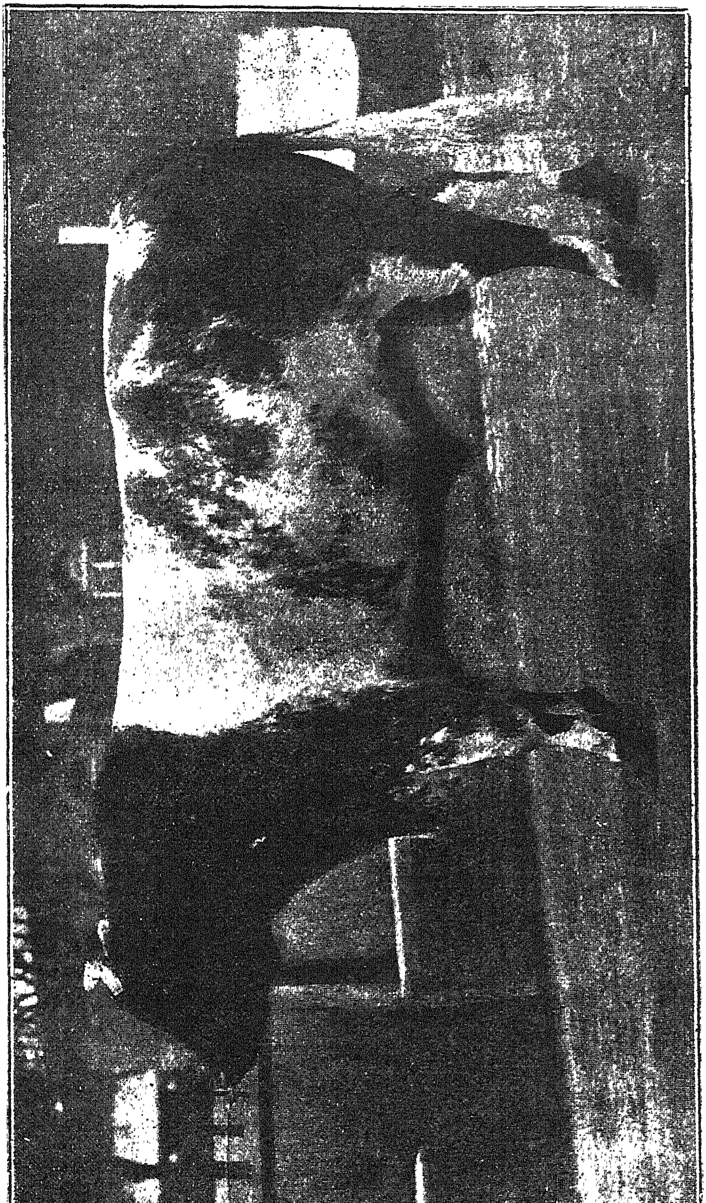


Photo. by Lafayette, Ltd.

SHORTHORN BULL, INSPECTOR.

Winner of First Prize and Chaloner Plate, Royal Dublin Society's Show.

this fungus is of no use. In the adjacent State of Victoria, our neighbours have tried the same fungus, but were successful only when rain had fallen just previously and humid conditions prevailed for a few days afterwards. Under these circumstances, it would be almost hopeless to try and cope with locusts in our dry north, by using locust fungus. But Cape Colonists have an equally effective agent in arsenic dissolved with soda, mixed with sugar, and sprinkled on the herbage near to where the locusts congregate; or the poison is sprinkled on chaffed maize or any other vegetable matter. This poison is so attractive that the locusts come from all directions within 30yds., eat of it, die, and are eaten by other locusts, which also die and are entombed in the same manner. Locusts of all sizes and ages are thus attracted, but the poison is most destructive when used against the newly-hatched insects. They then congregate in flocks, sometimes covering only a yard or so of soil, and occasionally occupy perhaps half an acre of surface. A very little poison then goes a long way in killing millions of them. Whilst in the hopping stage, the locusts can travel only very short distances; but whilst growing, until winged, they are most voracious, and do a great deal of damage. Therefore, if all occupiers in the neighbourhood of locust-infested land were to combine and distribute poison, as above indicated, the number of adult flying locusts would be enormously diminished, and the damage by the young locusts prevented.

As an instance of what may be effected by prompt action when a pest is first detected, the work done by the Mount Gambier Branch of the Agricultural Bureau should be mentioned. The so-called Canada thistle (*Cnicus arvensis*), or English meadow thistle, was found on a small patch of land at Compton Downs. The owner of the land would do nothing for its extermination, and there were no means of compelling him to do so. The thistle was known to be most difficult to deal with, and likely to ruin the whole of the arable land in the district if left to nature, so the members of the Bureau obtained consent from the landowner to deal with it; and they spent a deal of money, and for about four years they used unceasing but effective efforts to eradicate it. By their patriotic action the members of that Branch saved that part of the State an annual loss of many thousands of pounds.

Seemingly oppressive and cruel measures adopted by the health boards have from time to time prevented the introduction of diseases which, if they had gained a footing here, would have possibly decimated our population; and the drastic measures followed when unfortunately some such diseases as bubonic plague, smallpox, &c., have gained an entrance, despite the vigilance of those active officers, have so far been successful in stamping them out before much mischief has been wrought. There are people who object strongly to the maintenance of officers for the protection of life and property—more especially when the duties of those officers affect their personal interests or touch their pockets; but let any-

thing arise where the absence of such preventive officers affects their interests, then they will make noise enough with an opposite intention.

Many of us remember the fearful storm of opposition and indignation that was raised by the passing of the Scab in Sheep Act. Fortunately the Act was vigorously and fearlessly enforced by competent and zealous officers, and the microscopic mite, which was said to "infest every post and stone throughout Australia," was completely exterminated. Australasian pastoralists are of one mind now in respect to the practicability of dealing with scab, and it is a great pity that our horticulturists have not arrived at the same happy conclusion with respect to codling moth and other pests.

What a tremendous annual loss could have been avoided had restrictive measures been adopted a few years ago in respect to the importation of plums and other fruit in codling-moth-infested cases, and how easily could it have been stamped out during the first two years after it had been so introduced. Now there is but one effective remedy, and that one so drastic and heroic as to appal the stoutest heart. Yet it would be better to adopt that remedy at once, and prevent the annual loss sustained by the continued existence of the pest. The caterpillars cannot exist without fruit to sustain their life, and if all fruits were at once gathered when just formed the moth would cease to trouble us until re-introduced. If this drastic remedy is not adopted—and I have no expectation that any large majority of our fruit-growers can be educated up to that point—we must depend upon spraying arsenical compounds (which save up to 95 per cent. of the apples and pears in many orchards in America) and upon bandages, gathering of affected fruit, and various other laborious and costly operations.

Had Australians been wiser, or better informed, they would have arisen as one man against the first rabbits, hares, sparrows, foxes, goldfinches, starlings, snails, and numerous other pests that have been introduced from other countries. But we were sentimental, and hailed with pleasure the harbingers of our ruin. They increased rapidly, and when they began to become pests in the first centres of their occupation, and complaints were made of their ravages, no alarm was created in localities that were unaffected, and no remedial or preventive measures were adopted until in certain cases the pests had become so widely and numerously disseminated that it was practically impossible to cope with them. Even when legislation was resorted to, when Acts were passed, and municipal corporations and district councils were empowered to adopt active measures for suppression, there were not a few of such bodies who either neglected or absolutely refused to put the Acts into operation, whilst adjacent corporate bodies were doing everything possible to eradicate noxious weeds or destroy pestiferous birds, &c. Numerous instances have been given, too, where local justices have been most reluctant to convict offenders when charged by district councils with neglect or l to obey instructions to deal with noxious weeds, or rabbits,

or other pests; and in some cases, where it has been impossible to avoid convictions, the justices have imposed the minimum penalty, reduced to a merely nominal fine, and have adjudged the complaining council to pay the costs of the action.

Through neglect of rational precautions we have annual bush and grass fires, destroying many valuable human lives, rendering hundreds of industrious families homeless and destitute, burning great numbers of live stock, and destroying crops, grass, fences, and everything else, over thousands of acres of land. Fires will certainly occur, through negligence and other causes, but why should they be allowed to extend over such large areas, and cause such awful, but preventable, damage? Surely it should be possible to feed down the grass, or otherwise to denude the land of combustible matters, over sufficiently wide strips to confine the devastation to limited areas. Is it a sufficient protection to plough two or three furrows between a railway line and a heavily-grassed dry paddock? Would it be possible to prevent "accidents" in such a locality by feeding bare three chains next to the line? If so, similar practice might be adopted in other places. Crossbreaks could be cleared, by stock or otherwise wherever there is possibility of disastrous fires. Where these should be made ought to be arranged each year before the middle of August, and the firebreaks should be completed before the end of that month. If necessity arises, any loss or damage to the owners or occupiers of the lands used as firebreaks should be defrayed by the whole district protected thereby.

Where necessary it is imperative that our producers shall co-operate for the general good. In all matters affecting the community as a whole the duty of attending to it belongs to the Government or the local governing body; but where the interests of a section of the community are involved, that section must act in concert, and vigorously too. Such co-operation would be justified in insisting upon the enforcement of all laws and regulations for prevention of the introduction of pests and diseases of every kind; for the adoption of all reasonable measures for control, suppression, or extinction of any pests, diseases, or other damaging agencies that may exist, or be liable to exist; and, if they will go much further in co-operation for the advancement of the general or individual welfare, th y can do much goo l and no harm.

A South African Stock Sale in War Time.

English farmers have little idea of what farming is like at the Cape. A settler there recently wrote home from near Port Elizabeth. His farm is about five miles out from the town, and he has some fifty head of cattle, several mules and horses, about 100 head of Colonial and imported pigs, besides some 1,000 head of poultry.

The writer goes on to state that he attended a sale of Friesland cattle at Addo Bush:—"Amidst all the turmoil of strife and war

through which we are passing, a quiet, peaceful sale appears out of place. But looking forward to the time when peace will be declared, and the more peaceful occupation of agriculture takes the place of present strife, I wended my way to the celebrated Addo Bush, on the main line to Kimberley, to attend the sale of the late Mr. John Holland at Commando Kraal, who visited the old country for his health and died there some few months ago. Mr. Holland has always been in the front rank as a noted breeder of Friesland cattle, both for show and for stock purposes, and everybody was therefore familiar with the name of John Holland. Addo Bush is one of the few places where the wild elephants roam. At the Addo Hotel the proprietor uses elephants' hoofs for spittoons, and heads of buck, boar, &c., adorn the walls. It was here some twelve months ago that Mr. Attrell, a Somersetshire gentleman, lost his life in an encounter with an elephant in the bush; this is from 6 to 8 ft. high, but so dense that one can scarcely penetrate through it. We arrived at the farm about 5 a.m. Coffee and sandwiches were awaiting the early visitors. Not many people were about at that time, but the farmers soon began to put in an appearance, driving pairs of horses in Cape carts; others came riding across the veld in groups of two or three. It was easy to distinguish the English from the Dutch a long way off, by the peculiar manner in which they sit in the saddle. After inspecting the stock, which were divided out and placed in small pens formed of the African mimosa thorn, breakfast was announced. This having been done ample justice to, the visitors came in for observation. But the other surroundings were vastly different. One missed the green fields, enclosed with hedges of growing wood. Here as far as the eye could discern there was nothing but bush, on which it seemed impossible cattle could thrive. Yet amongst this the cattle lived. They were in very fair condition considering the severe drought through which we are passing; but the ticks, the curse of African cattle farming, were very much in evidence. Out of about 100 cows there were only ten which yielded milk in all four quarters; some only had one left. The ticks get on the udder and embed themselves in the flesh; this festers and closes up the milk ducts. This caused every buyer to be anxious to know if quarters were all right. The loss through these ticks alone at this sale was over £200. But it was said that if the drought had not been so severe, thus causing the cattle to wander so far into the bush, and preventing their being driven home to the kraal, the tick ravages might have been prevented by rubbing the udders with a mixture of paraffine, whale oil and brimstone. I purchased eighteen heifers and a bull. Then I had to go to the commanding officer of the district to obtain a permit, and trucks to load them in. I made tracks for the station. There some recruits were drilling and being sworn in. All the trains that passed were loaded with military stores. The train by which I travelled had some five or six trucks of commandeered horses attached to it; and as we passed the bell tents of the soldiers guarding the various bridges, I thought that there were many changes of

life to be seen in South Africa. As to the prices. An imported bull realised £105; milch cows made from £15 10s. to £27 10s. each; dry cows from £8 15s. to £16 10s. each; heifers from £9 to £14 7s. 6d.; ostriches made from £3 to £6 12s. 6d. each; sheep sold at 27s. per head; donkeys, £11 2s. 6d. each; horses, £20; and ponies from £7 10s. to £23. So you see prices are not so bad in Africa after all." —*Live Stock Journal.*

Domestication of the Zebra.

A report by Mr. R. J. Stordy on veterinary work in the British East Africa and Uganda Protectorates for 1898-1900 has just been issued by the Foreign Office.* Mr. Stordy, after dealing with the occurrence of the tsetse fly disease, South African horse sickness in its various forms, rinderpest, liver-fluke, &c., urges the advisability of utilizing for purposes of transport, the zebra, which is "naturally immuned against the ravages of the tsetse fly disease and horse sickness," and which exists in enormous numbers. He says:—

"I am convinced that, should the Government enter upon a scheme for its domestication, it would prove one of great value, and that at no very distant date a supply of animals would be available, not only for African service, but also for Army transport work at home or in India. The great difficulty so far has been the domestication of the adult animal. I have, however, to suggest the following plan for obtaining a possible way out of the difficulty:—I would propose that a kraal be formed within a district where firearms are non-existent, as in the case of a preserve. The kraal would have two extending arms leading from the open country into it, and would be constructed large enough to hold a herd of, say, 50 adult animals. Several mounted Cape boys would be employed, whose duty, in the first instance, would be to accustom the zebras in the neighbourhood of the kraal to the sight of horses or mules. If my anticipations prove correct, the zebras will in the course of a few days follow the horses or mules, and advantage could be taken of this to lead them into the kraal. If it were, however, found that they would not be led it would be necessary to have them driven in by the Cape boys, assisted by swift-footed natives. The animals being in this way confined within the kraal they would naturally propagate their species. It is with the offspring that I would propose that the experiment in the way of domesticity would begin. As is well known, it has been found nearly impossible to rear a zebra foal apart from its mother. I would not propose to separate them, they would live along with and be nurtured by their mothers. A few months after birth the young animals could be caught and by various ways become accustomed to the sight and presence of man. I am very hopeful that in this

* Diplomatic and Consular Reports, Miscellaneous Series, No. 556.

way a number of young animals of both sexes would become domesticated and prove useful for transport service, and also in propagating their species. The second generation, if my experiment prove in any way successful, would be even more domesticated than their parents, and I am sure that in course of time a large supply of the domesticated zebra would be forthcoming for the future use of transport work at home and abroad. The initial cost might be a little more than the first results might justify, but there is no reason to doubt that in the long run the ultimate results would far more than compensate for the initial expenditure."—EDITOR.

Chinese Ponies.

Respecting these little nags the *Live Stock Journal* says:—

"The Chinese pony seems to be a better mount for the traveller in rough country than the mule. Mr. Archibald, in his entertaining account of a journey to "Mount Omi and Beyond," says, at one stage of the march:—"We were in company with a train of pack mules; we had descended one side of a ravine a couple of hundred or more feet deep, and were cautiously threading our way up the recently-made, narrow, slanting track that led up the almost vertical slope on the opposite side, when the new made ground began to move in a spot which my companion had happily passed over in safety. I whipped up my pony, and he nimbly scrambled over on to the safe ground, but a mule immediately behind me went rolling down over and over with the shifting shale which composed the wall of the ravine, and was instantly killed, falling on his back at the bottom. I was thankful I was riding a pony and not a mule, as these invariably lose heart in a difficulty, and do not respond to the call of the rider as does a high-spirited little pony." They hired one, "a four-year-old bay stallion, with four black legs, black mane and tail, standing 11h. 1in. in height, altogether one of the most perfect specimens of horseflesh in miniature one could wish to see. He was very skittish and lively, but good tempered and quite free from vice." This steed began by running away with Mrs. Little. He proved a wonderful mountaineer. On one of the worst roads encountered, a path cut in steep steps over sharp-pointed rocks, "the little animal behaved splendidly, as usual, never refusing anything he could get his little legs to stretch to; never halting at the steepest and highest rock step except occasionally to take breath; a few moments sufficed, and he was off again at a scrambling canter." Another pony, also a stallion, was so quiet that when Mr. Little took him into the hut he occupied at night, out of the falling snow, he would lie down on the straw beside him and behave "like the little gentleman he undoubtedly was by birth and breeding."

These Chinese ponies carry extraordinary weights for their size. To cross a lofty pass in the mountains Mr. Little wanted a pony for

his wife, who accompanied him, and was supplied with a bay pony about 11 hands high, which carried him (13 st.) and Mrs. Little by turns. "It seemed cruelty to animals to make him climb such a mountain-side at all. . . . As it was, the little creature, though we were going only at a slow walk, had to stop every few paces and take wind." At a later stage the travellers hired a pony 10 hands high, which proved both surefooted and equal to the weight assigned him. As pack ponies these 11-hand animals carry a burden of 250lb. of rice over the hill track in Central China."

This sounds well for the Chinese pony, but a writer in the *Texas Stock Journal* entertains the following opposite opinion:—

"Polite language fails in any effort to describe the Chinese pony, for he is the meanest little brute in the whole horse family. The western American mustang has his faults, but he also has his virtues, and therein he rises above his oriental cousin. The China animal is underbred and undersized, pigheaded, vicious and contrary, and generally lacks speed and endurance. His gait is an absurdity, and his only show of spirit comes when you are inspanning, as the Boers say. At that moment he can kick and strike with all four legs, and bite at practically the same time. He is generally so small that you feel ashamed to mount his back, but he is no better when he comes in larger sizes. The Chinese are probably responsible for many of the shortcomings of their horses because very few of them know anything about handling horses. When they drive they alternately push and pull on the reins, and when they whip or punish their horses they generally strike them on the head. The allied armies have picked up thousands of them, and they are easily one of the horrors of the war. The Chinese saddle is equally as foolish as the Chinese horses. It consists of a great wooden tree covered with an immense rug, usually a padded and quilted affair done in bright cloth or silk, and two impossible girths. They are as uncomfortable as they are absurd looking. The foreigners are using hundreds of them, for saddles are very scarce."

We hear that the Burmese ponies which took part in a public parade thorough the leading thoroughfares of Cape Town, and proceeded to the front, have all died up country.—EDITOR.

ENTOMOLOGY.

Locust Extermination

(Continued from page 781.)

Observations of Professor Bruner.

North American Fungus.—Mr. Lawrence Bruner, Professor of Entomology of the University of Nebraska, charged by the Chamber of Commerce of Buenos Aires to make investigations repecting the locusts that invade the Republic, in his Report referring to the fungus which attacks that insect, declares that the North American fungus or *Empusa grylli* is that which causes the disease that frequently attacks and destroys millions of the jumping locusts, as also the migratory locusts of the United States. He states that this fungus operates better during the warmer and damper part of the summer, and appears to attack the more developed insects better than the young ones.

When an insect is attacked by this fungus, it first becomes torpid in its movements, and shortly before dying it fastens on to some plant—with its front and middle feet. In this position it dies, and remains securely fixed to the plant for some time after death

The bodies of insects dying as the result of the fungus get somewhat swollen, and very soft, and fragile. Some days after death the body becomes dry and breaks at the joints, by this means allowing the escape of the grey germs, like powder, to be afterwards scattered by the wind.

If other locusts alight to eat the vegetation which these germs have reached, and if the weather and other conditions are favourable, they are also attacked, and die of the disease.

This fungus is very general in the more moist localities of the United States, and is also largely found in the irrigated districts of arid regions.

Not unfrequently towards the end of the summer the disease becomes so predominant that up to two dozen or more dead locusts can be found fastened to a single plant. According to Professor Bruner, the *Empusa grylli* is also found in the Republic, and on two or three occasions he has found locusts killed by it.

Argentine Fungus or Carcaraña.—Referring to the Argentine Fungus or Carcarana, he says that to ascertain the exact species to which it belongs, samples of locusts killed by it were sent to Professor Charles F. Bessey of Nebraska, who is a specialist in that line of study. The said Professor wrote that he considered it a great discovery, and hoped that experiments would prove it to be a valuable means for the destruction of locusts.

Up to the date of Mr. Bruner's report, no communication had been received from Mr. Bessey, and it is to be regretted that if it has been received since, it has not been published.

Locusts attacked by the fungus of the country, instead of fastening themselves to the upper extremities of the various plants, hide themselves from the light, and anxiously search for dark and damp places, wherein to die. For this reason they are mostly found at the roots of shrubs and herbs, amongst dense and damp foliage, etc. After death, their bodies become filled with microbes and fungus germs. Under certain conditions, and in many instances, these germs also partially cover the exterior of the bodies.

Experiments made with this fungus in breeding boxes gave very good results in many cases; while in the open country, many of the flying locusts were seen to succumb shortly after their arrival from the North, assuming a very vivid colour. Upon examination, it was found that this colour was owing to great quantities of the same kind of germs found in the locusts previously mentioned. Healthy insects have the same disease communicated to them by dusting their food with the infective fungus.

Mr. Bruner concludes his report regarding this fungus by stating that in the vicinity of Carcaraña, where it was discovered that it works actively, having nearly exterminated a column of insects, there exists a great reserve of bodies of locusts which can be used for communicating the disease to other columns of flying locusts.

Cape Fungus.—As regards the Cape fungus, the experiments made have given less satisfactory results than those made with Carcaraña fungus. In breeding boxes the locusts exposed died, but in the open the use of fungus did not by any means produce such favourable results. Upon this point we would mention that we consider the difference in the results as somewhat curious, if the fungus has been obtained from the same neighbourhood. The condition of liberty of the locusts, or their captivity in breeding boxes exposed to the open air, and without introducing any circumstance affecting the influence of the atmosphere, can only produce differences of concentration, and this cause cannot determine such distinct results, Professor Bruner does not say upon which class of free locusts he made his experiment, nor if he made in the same locality, and simultaneously with that upon the captive locusts. If it was upon the free flying locusts, it would be interesting to know the means adopted to ascertain the results with any degree of certainty, which we hold was impossible, considering the mobility of the columns, if he did not follow them in their march, assisted by reliable agents for observation. Neither does he give the locality in which he experimented, which is very important in forming an opinion on the influence of the climate. It is well to remember that the causes of inefficiency may be accidental, and arise from the state of the cultivation employed, or to other circumstances.

Various Considerations.

The experiments made during the spring of 1897 and beginning of summer, Mr. Bruner states, show the inefficacy of the manner of fighting the locusts, if all other methods are excluded. This objection does not absolutely affect the value of the method, nor exclude its worth. We are quite in accord with it, and it is applicable to all methods for the destruction of locusts. It is a general rule that the effectual application of any method requires its opportune use, and that the previous application of one method may render unnecessary the subsequent application of other means. The propagation of fungus epidemics, without being excluded in whatever stage of the insects after hatching, is essentially for previous application. The necessity for the application of subsequent methods is governed in exact relation to the success attending previous means adopted. Greater success is obtained by studying certain favourable circumstances which determine the opportunity for the application of a certain method. The tact of the operation, no doubt, also contributes largely to success.

The same professor, continuing his report, states that in the Central Offices, as well as in other parts of the Republic, exhaustive trials were made with the fungus of the Cape and Carcarañá, but with the same negative results, "except where by chance the climatic conditions at the time were favourable."

"But always having on hand a good reserve of locusts killed by fungus, and using them where opportunity presents itself, and conditions are favourable, good results may be expected."

Experiences of Messrs d'Herculais and Langlois.

We will conclude our dissertation regarding experiments with fungus by mentioning those effected by Messrs. Julio Künckel d'Herculais and C. Langlois, in Algeria, during the year 1891.

The first named, Assistant Naturalist of the Museum of Natural History of Paris, was charged by the French Government with a mission to Algeria, with the object of studying the natural causes of the invasions of the migratory locusts, and to make investigations regarding practical proceedings for destroying these insects; and he is now with us, in consequence of our Government having obtained his services for the country, so that his advice and experience should be available for the destruction of the plague.

The experiments made by Messrs. d'Herculais and Langlois with the fungus *Lachnidium acridiorum* have induced them to form an unfavourable opinion as to its use as a means of combating the plague. Those experiments revealed that for the development of the disease certain conditions of moisture were necessary; that the insects were attacked only in moist places; that even in captivity, to produce the fungus, it was necessary to cover the cages with wet cloths. The gentlemen named, considering that these conditions were difficult to find in the open air, and taking into consideration

the existence and development of the locust, it appeared to them impossible to fasten their hopes on a means of destruction based upon the artificial cultivation of the fungus parasites found in the locusts.

CONCLUSIONS.

The foregoing demonstrates that effective results have been obtained in the propagation of fungus epidemics in columns of free locusts, when the experiments have been made in favourable climatic conditions. From these experiments we gather also that the destruction occurring from the use of this important means of fighting the plague is attributable to the fact that the work has been carried out by chance, as far as the climatic conditions are concerned, and no doubt chance has also mediated regarding the time and opportunity for the experiments; positive results, nevertheless, have been obtained when the experiments were made under favourable conditions.

The unfavourable opinions arrived at by Messrs. d'Herculais and Langlois assist in confirming the principle that the method is effective if applied opportunely, therefore they are principally based upon the conditions of the existence of the locust, which is characterised by its migrations and continuous movements, and on this, without doubt, should rest the greater reasons for those opinions, as in some places this same fungus has operated effectively on free insects which for experiments on captive locusts required extraordinary conditions, so as to obtain the necessary moisture for its development, a circumstance which may have depended upon the climate of the locality in which the experiments were made, and which would have been quite different had an appropriate region been chosen. It therefore logically follows that the question raised by the difficulties opposing the application of the method is solved by finding the zone or zones favourable for the development of the fungus epidemics, by the condition of the climate and by the natural concurrence of the columns.

PECULIARITIES FAVOURABLE TO THE PROPAGATION OF FUNGUS EPIDEMICS.

Adaptable Climate.—We have already expressed the opinion that the subsistence of the difficulties opposed to the propagation of fungus epidemics arises principally from deficient observations regarding the locust and its migratory evolutions. This opinion is confirmed on discovering certain peculiarities of the columns in their evolutions favourable to the development of those epidemics amongst them.

The locusts, from preference, invade the damp zone (one of the dampest in the Republic), the rainy coast region, and also from preference the vicinity of ponds of water, or damp places within certain temperatures, avoiding those which are excessively hot or moderately cold.

These circumstances, and the climatic conditions of the zone of their permanent abode, confirm the opinion that the locust is adapted

to a damp and warm atmosphere, and that the intensity of the heat propitious to them is analogous to that of mid-summer in the temperate zone. This opinion is further confirmed by the lesser resistance offered by the locust in the various stages of its development to the influence of intense heat or drought, and the greater resistance offered to the influence of intense cold or moisture. These differences of resistance are much more noticeable in the first stages of the insect, which is the period at which they are most sensitive to the changes undergone in the course of adaptation.

Permanent or Wintering Zone.—The permanent or wintering zone is situated in the Western part of the Chaco, and embraces the Chaco region of Salta, extending northwards beyond the limits of the Republic, until the warm temperature becomes tolerable to the insect; to the South the known limits of irradiation are determined by the most accessible parts of the Chaco zone, north of the Salt River, in the province of Santiago del Estero.

The existence of the zone referred to is beyond doubt. It is fully confirmed by the observations of all who have attentively followed the movements of the plague, and also by the observations gathered by the Central Commission for the extinction of locusts during the campaigns of 1897 to 1898, 1898 to 1899 and 1899 to 1900.

The habitual permanent zone extends to the extreme North of the Republic, in the confines of the temperate zone, and the Tropic of Capricorn, in the sub-tropical region—one of the most warm and damp of the National Territory. Its temperature, although inferior to that of the torrid zone, is superior to the temperate zone, and during winter it maintains a temperate atmosphere, analogous to summer in the regions most frequently invaded by the locusts. Its territory is characterized by luxurious vegetation. Its rivers, streams and numerous water-courses cause intense saturation of the atmosphere. The fall of dew is very heavy, rains are frequent, but particularly in summer, when they are very continuous. In that zone the locusts pass the winter, gathering there towards the end of summer, remaining there until the heat becomes intense, when they begin their invasions.

The Migrations.

Migrations are explainable.—Protected as is the conservation of the species animated by the manifestations of their sensitiveness, the abnormal impressions which they receive antagonistic to their existence cause them to make defensive movements tending to avoid these impressions, as also the causes which produce them. The locust avoids climatic conditions unfavourable to its adaptation. When, in the habitual permanent zone, the temperature exceeds the limits of its adaptation, the columns emigrate, following propitious atmospheric currents, and avoiding any unfavourable atmospheric surroundings. Thus they are found in regions foreign to those of their habitual permanence. Their presence in zones other than that of their adoption is explained by their having followed those atmos-

pheric currents which, favourable at first, have afterwards become modified by the influence of elements encountered in their course, or by having avoided unfavourable atmospheric currents, which have also undergone modifications.

Finding themselves in those zones, if not detained by imperious physiological necessities, they tend toward less unfavourable atmospheric zones, and, following or avoiding atmospheric currents, according to the condition of the atmosphere, thus successively reach less unfavourable climes, and eventually arrive at the propitious terminus, assisted in their movements by the rotation of the regional climates caused by the succession of the seasons.

Routes of Invasion.—The routes of the columns are governed by the zones of greater atmospheric moisture, within certain grades of temperature. The movements of the columns along the principal or general routes succeed each other with notable regularity as regards time and place, according to the extent of territory embraced in the invasions, and the intensity of such invasion.

The local movements are contradictory, but they do not affect the precision of the general movements in which they become involved. The principal route of exit from the zone of their habitual permanence, through which the bulk of the columns pass, coincides more or less with the course of the Salt River, which crosses the province of Santiago del Estero. The columns descend along that river, and spread through the provinces of Santa Fé and Cordoba, entering the latter in the vicinity of Mar Chiquita.

Invasion of the Central and Andean Regions.

Influence of the Mountain Ranges.—The columns that successively come out of their wintering zone go on extending their radius of invasion, advancing, some to the shores, others to the South further and further according to the intensity and influence of the currents that guide them, and inclining them towards the West, abounding especially in the neighbourhood of rivers and cascades descending from the mountain ranges of Cordoba and San Luis, as also those of the rivers Desaguadero, Tunuyan, Atuel, Diamante, where they unite, and follow the sinuous course of the rivers.

When the conducting currents are more powerful, the invading columns have reached further south, being found also in greater numbers adjacent to the rivers Negro and Neuquen. These columns in their passage to the South, throw out branches toward the East which spread the invasion in the provinces of Santa Fé and Buenos Aires. In their principal advancing movements they describe curves, more or less prolonged, altering their direction from South towards South-West and West, afterwards altering it to North-West and North. They invade the Andean provinces, concentrating preferably in irrigated or marshy zones, maintaining as the principal route of the invasion the region adjacent to the river Desaguadero, and the lakes of Guavacache and Silveria, and also, although to a less extent, the river Bermejo in the province of San Juan. The

mountain ranges of the provinces of Cordoba and San Luis cause deviations of minor importance tewards the West at the time of starting or on the southward march; therefore the greater density of the invasion descends by the Eastern zone. The influence of these mountains is more noticeable during the return movements or northward march, when the columns coming from the south or from certain positions in the south-east, divide into two great ramifications.

The invasion of San Juan and Mendoza depends upon the columns descending further south, so that on their northward movement these provinces lie in the route of transit. Nevertheless, even when the columns follow the course indicated, the influence of currents coming from the mountains, at certain times of the year, modifies their course, inclining them to the east, and the columns skirt the Huerta Mountains and the region of the salt pans on the East without penetrating San Juan, passing through Rioja and Catamarca, following the direction of broken ground, rivers and irrigated zones. At this height of their march, their course inclines them more to the east, and they concentrate in the moist region skirting the Aconquija Mountains on the East, and crossing, or going round them, pass through Tucuman, Salta and Juyuy, entering their wintering zone.

Invasion of the Rainy Coast and Region of Mesopotamia.

Of the invading columns which have descended the river Salado, and penetrated to the vicinity of Santa Fé, some advance towards the coast of the Parana, and penetrate Entre Rios; others, avoiding the low temperature caused by the fresh southerly winds, proceed to the north, reaching the river Pilcomayo, and even as far as Villa Concepcion, according to the intensity of these currents and the magnitude of the columns that have been subject to their influence.

They enter the Republic of Paraguay if they have succeeded in reaching its borders, and when the hot tropical winds blow, they return south, entering in the neighbourhood of Itati and Ita-Ibate in the province of Corrientes, where they amalgamate with the columns which, ascending the river of the same name, have reached the marshes of the Ibera.

The southerly course then becomes more defined, and even when the columns throw out branches towards the east (which for preference follow the zones where water is plentiful, such as the Morcoreta in the National territory, and the Cuaremi in Oriental territory) receive the affluence of other columns, which have advanced by the Guayquiraro, and extended by San Jose de Feliciano, pass into the province of Entre Rios, in which they advance towards the south, their route coinciding with the course of the river Gualeguay. The movements of columns continue under the influence of propitious or adverse atmospheric currents, which cause branching out or concentration of the invading columns.

The column advancing south, following the course of the river Gualeguay, enters the province of Buenos Aires by San Pedro and

Baradero, and concentrates towards the river Arrecifes, Canada Houda and the river Areco.

The columns that operate in the mid river region generally move towards the east, south-east, then south, and finally south-west, to afterwards revert to west and north-west, according to their situation, and re-enter their wintering zone, passing the Parana, and following the course of the river Salado.

Influence of the River Plate.—The invasion of the province of Buenos Aires by the mid river column does not occur, or is very weak, if the invading columns from the coast have not been very intense, which they are not, when, before leaving the river Salado in the province of Santa Fé, they have been frequently subject to the southern atmospheric currents, which cause the temperature of the northern coast to fall. In that case, the greatest intensity of the invasion is felt in the oriental zone of the province of Corrientes, and occidental zone of Santa Fé. Its advance south we have already described. Thereupon the invasion of the province of Buenos Aires begins in the district of General Villegas, and in the 5° meridian, as it occurred in 1897 and 1899.

There are two principal routes of invasion on the southerly march. That which descends through the centre of Corrientes and Entre Rios, and that which descends by the oriental region of Cordoba, bordering on the province of Santa Fé, both throwing out detached wings, which spread the invasion throughout the territory subject to them; the importance of one and the other being subject to the southerly currents already mentioned. In the present invasion, the influence of these fresh currents, very frequent during the spring of this year, has minimized the importance of the Mesopotamic invasion.

The rivers Parana and Uruguay are not properly favourable to the invasion of the regions lying to the south of their courses, probably by reason of the cooling influence of the great estuary, which causes atmospheric currents less propitious for the insect.

Influence of the Atlantic.—The influence of the fresh currents from the Atlantic are also noticeable in that part of the province of Buenos Aires bordering on the ocean.

That region is always free from invasion more or less in a radius the centre of which would be Cape Corrientes, and whose circumstances would put Point Piedras, and the coast of Tres Arroyos, in proximity to Bahia Blanca.

During the great invasion of 1896 to 1897 columns of locusts that crossed the sea from the coasts of Uruguay to Mar del Plata remained only a short time in that region, and advanced to the north-west until they reached the line of the river Salado, which at that time (September 1896) marked the limit of the invasion in some parts. We will suppress the enumeration of other influences observed with a view to curtailing our remarks, and avoiding too long a diversion from our principal object.

Movements of Concentration and of Dissemination.—As will have been observed, the movements of the columns are twofold, that of

leaving their habitual permanent zone, or dissemination in those territories subject to invasion, and that of returning to that zone, causing their concentration.

The young locust born in territory foreign to the habitual permanent zone, finds itself scarcely able to fly before it directs itself to that zone taking a direction in accordance with the movement of concentration that we have described. The routes they follow depend upon the geographical position they occupy when beginning the march.

Influence of the movements of the columns on the propagation of fungus epidemics.—We note the foregoing details on the nature of the movements, because they influence the efficiency that may be obtained regarding the propagation of fungus epidemics, which, as we have seen, require for their development certain propitious conditions of atmosphere, being influenced no doubt also by the greater or less concentration of the columns, and the greater or less contact one with the other. For this object the movements of separation are not so pronounced, because the columns spread over a vast extent of territory, the zones of which are not always favourable to the development of the fungus, and where they are subject to the destructive action of man. These obstacles exist so long as the columns do not approach their wintering zone. So that the opportunity of applying the method presents itself when the movement of concentration is approaching an end. Not before, as its efficacy would be exposed to disaster.

The diseased locusts, which form the principal means of propagating the epidemics, are more easily destroyed, as they are less active in escaping than healthy locusts. Man, therefore, exterminates them, and thus involuntarily contributes to arrest the contamination of healthy columns.

Admitting that the germs were spread by columns attacked in regions favourable to their development, and that other columns thereby became contaminated, the subsequent movement of these to other regions unfavourable to the development of the disease could affect the suppression of the vitality of the infectious germ. It would be the antiseptic applied by nature.

The application of the method would therefore give less results during the movements of dissemination, and before that of concentration was complete.

Besides, not knowing the effect that the fungus epidemics might have upon insects beneficial to agriculture, and having no guarantee that its effects would not prove notably hurtful, it would be imprudent to employ this means on columns in cultivated agricultural places.

Opportunity of the infection.—The columns in their movements of concentration begin to arrive at their destination, in the neighbourhood of their wintering zone, during the autumn, and those arriving later from more temperate zones present themselves during the winter, such as those coming from Catamarca and Lo Rioja. Then would be the opportunity of infecting them. Even when the climate

of their wintering zone is damp and warm, and thus favourable to the propagation of fungus epidemics, there is good reason to suppose that the columns that take refuge there will also, from preference, converge to parts adjacent to places well watered, in which the saturation of the atmosphere is greater. In those parts, the conditions for developing fungus would be much more favourable.

The development of the epidemics is also favoured by those columns which, surprised by cold and cloudy days, in regions south of that zone, take refuge in the forests of Monigotes and others near, where the branches of the trees are covered and bent down by the weight of the locusts, which give the foliage a reddish hue, due to the colour acquired by the insect when subjected to the influence of cold.

In those columns, the very grouping together which they adopt to protect themselves from the low temperature, facilitates contamination.

Conclusion.

Possible Results.—The columns which have been infected will feel the effects of the disease when it has made certain progress; thus, the insects, torpid in their movements, would be surprised by death on the last branch on which they had settled. The process of decomposition following later, the bodies would dry up in some days, and allow the escape of innumerable germs, which, scattered by the wind, would germinate in the bodies of healthy locusts, or in places favourable to their development, which would become centres of infection, like those situated south of Carcarañá.

It might be argued that the excessive heat of summer in that zone would destroy the germs of the fungus, but this objection is not tenable; besides the fact that the fungus offers a certain amount of resistance to intense heat, the rich and luxurious vegetation in those parts affords numerous places of refuge from the sun's rays, favourable to their development. The virgin forests and meadows, saturated with germs, where the columns prefer to concentrate, and in which their infected bodies may have been left, would be centres of infection, where jumping locusts going therein to escape the excessive heat of the sun's rays, would contract the malady.

The wandering columns in that region would be the means of conveying the germs to those places frequented by locusts; those columns alternately in contact with one another, free from the action of destruction of man, would daily spread the fatal germs more and more. The result of the operation would be seen by the character of the invasion of the coming year, and the riddance obtained would effect a diminution in the costs of the plague occasioned to the Government and to individual persons.

As we have stated, this proceeding is essentially for early application, but it can be applied at other opportunities, the efficacy of which would then depend on the conditions under which it is applied. The application, if made when the columns are in their habitual

permanent zone, would result in progressive diminution, if not in the final suppression of invasions; but, as these would continue so long as there remained any uninfected columns, there would still be room for action in the zones of invasion.

Infection in the Zones of Invasion.—The infection of the columns in these zones could even be effected by the proprietors or occupiers of the land, once they were instructed in the operation.

Each agriculturist, having in his house in the country a certain supply of necessary ingredients, would have a few tubes of infectious matter to infect the masses of flying or jumping locusts which he might find on his lands, selecting the most favourable opportunities of using them.

Practicability of the Operation.—The carrying into effect of the idea we have had under consideration does not appear to present any difficulties, provided the knowledge obtained respecting the evolutions of the columns in the National territory is utilized. If a careful trial demonstrated the efficacy of the method, it would prove much easier and less costly than the onerous system of destruction followed to-day. With a small portion of the means availed of by the Central Commission to-day, it can be put in practice, and its success would be transcendent.

There even exists a clearly defined line uniting strategic conditions favourable to the carrying out of the procedure, embracing the people who, from this position as regards the wintering zone, would be available as stations for infecting the columns. This line is that extending from the Colony of Ceres to the City of Salta. Among the people embraced in this line, infecting stations could be established; as also in Rivadavia, Anta, and other points to the west and south of the province of Salta.

A telegraph line uniting these points would be recommended, to transmit announcements of the approach of the columns proceeding to the wintering zone, thus enabling them to be waited for with the elements necessary for their contamination, as also the necessary means of following them up to where they might settle, which would be at no great distance, with a view to guide them by simple means to the localities of infection, already prepared for them.

The period indicated to begin work on the land would be the month of March. Operations could be commenced earlier, but that would be the best time. The time which would have to be passed in waiting (which would not be long) could be used in preliminary work, such as organizing infecting stations, providing infectious materials, giving instructions, and other details.

Bacteriological Laboratory.—As a previous measure, a laboratory should be installed for preparing infectious materials. This should be under the charge of a person who, besides being competent, should be in favour of the method of procedure, and convinced of its efficacy. This detail is important, as it would secure greater elements of action. The laboratory, the installation and maintenance of which would not require much outlay, besides the study and cultivation of

fungus, would give other important services, the necessity of which the Central Commission has, no doubt, felt in the development of their labours. The method of fungus epidemics being divulged amongst the agriculturists, these would make themselves practically acquainted with it as a more effective and less costly means of destruction than barriers, ditches, etc., according to circumstances.

The laboratory would provide for the supply, if necessary, of the tubes of infectious material at cost price. Thus the agriculturists would find themselves armed against the terrible plague, sure of success, and the exchequer freed from a great part of the distribution which the destruction of the locusts imposes upon it, and probably the country freed from the forced taxation which the plague necessitates.

The forces and capital at present used in unproductive applications assist in the greater development of the production, and therefore to the increase of the public risk.

(Sd.) J. G. MANRIQUE.

Buenos Aires, December 1899.

Locust Fungus in Australia.

In connection with the reports regarding the use of locust disease fungus that have from time to time appeared in this journal, the annexed account by the Government Entomologist of New South Wales of its trial in Australia is published for general information. It is regretted that the results of the trial were so unsatisfactory; unfortunately no account is given of the atmospheric conditions under which they were made:—

Report upon Experiments carried out during the Seasons 1899-1900 and 1900-1901 with Locust Disease Fungus.

In the early summer of the last two seasons I have visited various places near Wagga and Condobolin to experiment with this fungus upon locust swarms that destroy so much of the grass and crops in those districts. I also forwarded a number of tubes of this culture, with instructions as to the method of using it, to gentlemen living in other infested districts, who have sent me a record of their observations.

In these experiments many thousands of locusts both in the wingless and adult stage were captured and dipped in decoctions of well-developed fungus; but I cannot say that in all these experiments that were carried out by correspondents or myself, we succeeded in inoculating a single healthy locust with the disease from the dipped ones. We had reports of numbers of dead locusts being noticed in several places after we had been there, but on investigation found that they had died from other causes. When winged locusts are treated it is very difficult to trace them 24 hours afterwards if a strong wind

springs up and pine scrub is plentiful, as, before their final flight, they move about in all directions. Even when in the hopper stage, there are frequently several mobs of them moving about in the same neighbourhood, so one can hardly be certain he has the same brood under observation.

At the time when locusts are doing damage in the Western districts, the conditions of our climate are most unfavourable for the development of fungus spores; not only are the days hot and dry, but there is no dew at night, so there is absolutely no moisture, which is so necessary to develop a delicate fungus mould. Under different climatic conditions, such as they have in South Africa, this fungus may be a great factor in the destruction of locust plagues; but in Australia we have to depend upon mechanical means, such as burning off the grass where the eggs are laid, just as they are emerging, or treating the grass with arsenical sprays. We have several useful parasites that destroy an immense number of locust eggs, and a fly that oviposits in the living locust, both of which when plentiful are a great check on their increase and are the cause of locust swarms diminishing and almost disappearing for intervals of a few years.

WALTER W. FROGGATT.

Destroying Locusts.

SOAP WITH CYANIDE, AND DIPS WITH GAS LIQUOR; FUNGUS.

At intervals during the past six months I have been favoured with notes on locust destruction by Mr. Wm. Roe of Graaff-Reinet, and from these we abstract the following:—

1. "Voetgangers come out small and march, resting the night on bushes. I have destroyed big swarms by noting the line of march and spraying them, or attacking their resting places, night or early morn. With a good spray pump you can fire a volley at them 20 feet away, and they will fall into a heap, seething one over the other, but never to rise again, the hop is over. The early stage of voetgangers is the time to attack, and to do it by spraying does not need so many hands, and does not ruin the veld as does driving and trenching, and stuff can be used to spray them that is a "killer for the locust," yet harmless to the stock.

Let me be distinctly understood. I do not try to spray poison that the locust may eat and die; that is not the way with the early swarms of voetgangers. You must use that which as soon as it wets them suffocates them. They come in too quick for eating. The dips, Quibel's, Little's and others, all help to do this, but alone, but slowly and imperfectly—they do not mix well with water, only make an emulsion. But when mixed with ten times the volume of gas liquor (a cheap waste product) they combine, and then will bear dilution with three times as much water for use—this makes a cheap mixture,

and is certain death to voetgangers when wetted with it in spraying—and the first time wetted, are at once marched into by the army. As you spray the arriving hosts, the heap increases. This is when you attack the marching army, when you get them in laager, you have only to fire a volley on it and there will be no more march. The evening is the best time for this part of the campaign. Do not drive the enemy on to your neighbour's land, have at him at once with, 'Thus far shalt thou come but no farther.'"

2. "As the destruction of locusts by spraying with soap wash is of considerable importance, and there are failures with some trials—the locusts reviving some time after—I have suggested the addition of a small quantity of cyanide to make the soap spray a certain success. Mr. Howlett's trials were thoroughly successful; but as the strength used was expensive, I have tried experiments with much weaker solutions, and find that the following can be relied upon to kill, and no mistake. One bar of sunlight soap mixed well into two paraffine tins of water and one oz. of cyanide of potassium added, forcibly sprayed on to the pests to *ensure wetting*, makes a good killer. My way of trial was to gather up a lot wetted with the mixture, keep them in a large paper bag, and putting some from this store out for a spell of sunshine and such like restoratives for suffocated creatures. *None came to* by any of the means tried. But when soap without cyanide was used, the strongest came to after varying intervals, and in the largest and strongest of them the hop was hardly prevented, except when there was a goodly heap of the creatures in which one helped to smother another. A fine spray with great force was most effective; it drove the air away from the breathers and covered them with the poisoned soap lather."

3. "Having the locusts at an unusual season, autumn, when we have our dampest air and light showers and mists, led me to try the Locust Fungus; and, as you see, it was successful."

Mr. Roe's "as you see" refers to a paragraph in a report from the Curator of the Graaff-Reinet Botanic Gardens. The Curator, Mr. Howlett, after considering sprays for the destruction of swarms of the pest which had invaded the gardens, states:—

"But another and perhaps the most deadly measure against the locust is the Locust Disease Fungus, which I used with good results and for which I am indebted to Mr. Roe, who supplied me with several tubes. After having used it a few days swarms of locusts were to be seen dead under the trees and bushes. These are readily devoured by others which in turn contract the disease; and so it goes on dealing destruction amongst them. . . . . . I feel sure that if this fungus was used more generally, especially by people with large gardens, we would soon have no more of these pests to contend with."

C. P. L.

HORTICULTURE.

Olive Culture.

The appended paper was read recently before the Clare Branch Agricultural Bureau, South Australia, by the Chairman, Mr. W. Kelly :—

My sole aim in calling the attention of this Bureau to the above industry is to create such interest in it as will lead to the extended cultivation of the olive—not in this district only, but in various parts of the State. The climate is favourable for the growth of the olive, and in the middle and southern districts the average rainfall will give sufficient moisture to properly mature the fruit. Seedling and other inferior varieties that are being grown in our neighbourhood have produced the general impression that it would not pay to cultivate the olive for commercial purposes. So little has been done in the way of olive culture in South Australia that the would-be grower here would have to rely upon his own resources, and to acquire knowledge by years of practical experience. Travellers who have visited European olive groves and interested themselves in the methods of culture there, as also the processes employed in preparing the oil for market, have, as a rule, been disappointed. In many places in Europe, where the olive has been grown for centuries, comparatively little effort has been made in the way of improvement, either in the cultivation of the soil, the system of pruning, the methods of gathering the fruit or in its manufacture. To obtain useful information in all the branches of the olive industry the learner should not look for it in Italy, Spain, Portugal, or other European centres, where old methods are in vogue, but to new fields of enterprise, where there are no great-grandfathery systems to hamper the hand or the brain. I think I am correct in stating that California takes the lead at the present time in olive culture. The growers in that go-ahead country have experimented with the olive in different soils, and with the most approved varieties, and in the manufacture of the fruit the very best machinery is used. The California State Board of Horticulture takes an active interest in all that pertains to olive cultivation, and it circulates periodically a vast amount of valuable information.

An important convention, in accordance with a call from the State Board, was held in San Francisco in 1893. This was the third olive-growers' convention, and it is reported that the greatest interest was manifested in the proceedings; and the matters discussed cannot fail to be helpful to South Australians who wish to cultivate the olive. Their first business should be to obtain reports and addresses

given by practical olive-growers in California, and to whet the appetite for such information I purpose in this brief paper to give a few extracts. Arthur P. Hayne, of Santa Barbara, said, "As things stand to-day, the Californian olive-grower is far ahead of the European engaged in the same pursuit. As I travelled from region to region, and from country to country, I became satisfied that even if we have had but a few years of experience to offset Europe's tens of centuries, we really know more about olive-growing and oil-making than they do." One would naturally expect that in the old olive groves proper attention would be given to the cultivation of the soil. The same authority has but a poor opinion of the system adopted by the bulk of European olive growers in preparing the soil. He says: "All along the Riviera of France and the Italian coast you see here and there a half-dressed peasant with a pick lazily grubbing away at the dry ground, or dozing in the shade of a 35ft. tree. Should you ask him about the best way to cultivate an olive tree, he proudly tells you that there is but one way, and that the way he is doing it is the only way."

Were we to refer simply to defective methods of olive cultivation little benefit would be derived. What is needed is something practical and helpful, and hence we turn to California for the information we require. Mr. J. L. Howland, of Pomona, says: "After two years of careful experimenting with the different olives, for bearing quality and percentage of oil, I find them as follows:— My trees were planted five years ago, and were two years old when planted. The Pendulina, Oblonga, Uvaria, Columella, Rubra, Regalis and Precox commenced to bear the second year, and have borne steady crops ever since. My Rubra and Pendulina trees averaged a gallon of oil to the tree last season of the very first quality. The Uvaria, Oblonga and Pendulina trees are the most even ripeners, so that all the fruit on the tree can be gathered at one picking." Mr. Goodrich, another California grower, has found the Correggiolo the best variety to be grown on all conditions of soils. It is one of the best known varieties of Italy, and especially of Lucca. In addition to the above favourite, Mr. Goodrich says that he is "grafting largely the Moraiolo and the Grossajo." Mr. Kimbal, National City, Commissioner for the State at large, gives his experience as an olive-grower:—"I have," he says, "tried a dozen varieties of olives, and have had no success that satisfied me except with the Mission; none that were constant bearers, none that carry out the differences given in the books for size of fruit or quantity of oil, but particularly in their ability to produce fruit: I have found nothing that compares to the Mission, and am raising no others, except a few trees of other varieties to experiment with." In answer to questions, Mr. Kimball said: "The reason why some do not get olives is, the trees are starved, if want of water can be called starvation. For lack of water the soil cannot furnish the material from which the olive is made. I have seen trees which were able to and did bear 15galls. of fine fruit, while 50ft. from them there were

other olive trees of the same size and age, and in which every physical and natural condition was the same, and that did not produce 15qts." He attributed the cause to want of water, and says: "If moisture is not there, it must be put there. I would not plant an olive orchard in San Diego County unless I had water with which to irrigate it. In Santa Barbara County the rainfall is more than three times what it is with us, the average being 9.9in., and sometimes this rainfall is not properly distributed so as to be of use to the planter." A member of the Convention is reported to have said, "I have an orchard within sixteen miles of the bay, in San Diego County, five years old, and we use no irrigation, and I think the rainfall is less than 10in." He had olive trees five years old, the tallest were probably 15ft., the average about 12ft. The soil was heavy and a long distance from water, but he saw no necessity for irrigation. Mr. Hayne, on being asked the method for picking the olive for oil in the olive countries he had visited, was, we think, somewhat sarcastic in his reply. He said, "When they get ready to pick they go out with long poles and beat the trees, without special reference to the olives, but giving the tree a thorough thrashing, and when they cannot see any more on the tree they stoop down and pick them up, after having walked over them all the day. Sometimes they put a cloth underneath, but as a rule they pick them right off the ground." Mr. Howland, of California, says, "The way I pick is simply to spread a canvas with a slit in it around the tree, then the limbs are held with one hand, while with the other the berries are stripped off, and let fall on to the canvas. In planting olive trees for a permanent orchard the quality of the soil should be taken into consideration, as also the variety to be planted, hence we would advise from 20ft. to 30ft. I have not grown the olive for commercial purposes, but simply for shelter and ornament. I find that it is a hardy tree and thrives in almost any kind of soil, and believe it may be cultivated with profit. I have culled the foregoing hints in the hope that they may be of some little benefit, or, at least, provoke profitable discussion.

The Spanish Chestnut.

In this journal, of November the 8th last, an article on the above edible was taken over from the *Australian Agriculturist*, and information was invited as to its culture in this Colony. The following notice appeared in the last annual report of the Grahamstown Botanic Gardens, and was written by the Curator:—

"I have from time to time made sowings of this tree. The seeds vegetated and grew well for a time, till about a foot in height, then the trees began to die. On inspection it was found that the roots of the young trees were enveloped in a maze of mycelium of some fungus, probably identical with that of a Boletus, which here

accompanies the oaks, not affecting their growth injuriously. If this idea is a correct one, the circumstance is curious, the oak and the chestnut being nearly related botanically."

The Spanish chestnut, so-called, like the oak and beech, belongs to the order *Cupuliferæ,* and is said to have been first brought from Asia Minor, though it has long extended throughout the South of Europe, where it is completely naturalized and forms extensive woods.

It forms woods and forests in mountainous parts of the temperate zone from the Caspian sea to Portugal. It has also been found in Algeria and towards the Tunisian frontier. It is an ornamental and stately tree, and in exposed situations is of a spreading habit with great size and longevity. It does not relish a damp, foggy atmosphere, prefers a light, dry soil, and succeeds only on a dry subsoil.

Cultivation consists chiefly in grafting good varieties on the trees which yield indifferent fruit. For this purpose, according to De Candolle (*Origin of Cultivated Plants*), the variety which produces but one large kernel (French *marron*) is preferred to those which bear two or three, separated by a membrane, which is the natural state of the species. The best chestnuts came from Sardis in Asia Minor, and from the neighbourhood of Naples.

Chestnuts constitute an important food element of the poor in Southern Europe, being used either roasted or boiled, and are ground into flour, and made into a sort of bread. They contain 15 per cent. of sugar, and by pressure yield a fermentable sugary juice.

The famous chestnut tree of Totworth in England was known as a boundary mark in the reign of King John; while a yet more celebrated tree on Mt. Etna is said to have measured 204 ft. in circumference. The timber is durable and hard, and is used in house building, for making furniture, and for many other purposes. The timber described in ancient buildings is usually however, really oak.

W.T.

Importation of Plants.

The following Regulations relate to the introduction of trees, plants and fruits into South Australia :—

1. In these regulations the following words in inverted commas have the meanings set against them respectively, that is to say :—

"Minister" means the Minister of Education and Agriculture or the Minister for the time being controlling the Department of Education and Agriculture.

"Inspector" means an inspector appointed under "The Vine, Fruit and Vegetable Protection Act, 1885."

"Disease" and "Insect" have the meanings respectively assigned to them by section 3 of the said Act.

2. (*a*) The introduction into South Australia of grape vines and any portions thereof, from any country or place, is absolutely prohibited.

(*b*) Living trees, plants, or portions thereof (not being grape vines or portions thereof), and fruits (not being grapes) may be introduced into South Australia from any country or place under and subject to these regulations, but not otherwise.

(*c*) Living trees, plants, or portions thereof (not being fruit), shall (unless sent by post) only be introduced into South Australia at Port Adelaide.

(*d*) All living trees, plants, or portions thereof, intended for introduction into South Australia must, prior to being landed or introduced, be thoroughly cleansed of soil: Provided always that any inspector may admit plants growing in pots, if in his opinion there is no danger in importing them.

3. All living trees or plants, or portions thereof, or fruits introduced into South Australia from any country or place shall, on being landed or introduced, be forthwith delivered into the custody of some officer of Customs, and shall, at the expense of the importer or consignee thereof, be conveyed in original unopened packages to such place as the Minister shall direct.

4. An inspector shall examine such trees, plants, or portions thereof, or fruits, and may treat such trees, plants, or portions thereof, or fruits, in such manner as he may think desirable, or may order that such trees or plants, or portions thereof, or fruits, and the boxes or packages in which they were packed, or either of them, shall be destroyed by fire if, in his opinion, there is any danger in importing them.

5. The expense of conveying such trees, plants, portions thereof, or fruits to the place fixed for their examination, and of the examination and treatment or destruction thereof, shall be borne by the consignee or introducer thereof, and shall be paid before they are delivered to such consignee or introducer.

6. No person shall be entitled to any compensation by reason of the destruction of any tree, plant or portion thereof, or fruits, or of any box or package under these regulations.

Regulation for Preventing the Spread of Insects and Diseases.

7. No person shall keep or sell, or expose or offer for sale, or in any manner cause the distribution of any living insect of the kind prohibited in any stage of its existence, or any tree, plant, or fruit infested with or affected by any insect or disease.

Penalties.

8. Any person guilty of any breach of the above regulations is liable to a penalty of not less than five pounds nor more than one hundred pounds, or to be imprisoned for any period not exceeding six months.

Repeal.

9. The regulations relating to the introduction of trees, fruits and plants into South Australia, made by proclamation dated the 21st day of November, 1900, and published in the *Government Gazette* on the 5th day of December, 1900, are hereby repealed.

Return of Fruit Exported

DURING THE MONTH OF APRIL, 1901.

VARIETY OF FRUIT.	NO. OF PACKAGES.	QUANTITY. LBS.	NUMBER.	DECLARED VALUE. £	s.	d.
Grapes ...	540	46,529		287	2	6
Pears ...	174		4,988	103	10	0
Pineapples ...	4		24	1	0	0
Apples ...	1		200	1	0	0
Totals ...	719	46,529	5,212	392	12	6

MISCELLANEOUS.

The Late Dr. Kohlstock.

The unexpected death of Dr. Kohlstock, which occurred at Tientsin on April 15, causes a great loss to the medical department of the German Army, in which he was regarded as one of the best and ablest organisers. At the time of his death he was forty years of age, and was sent, some months ago, to Tientsin, with a view to directing the military hospital there. Prof. Kohlstock will be best remembered in this country by the conspicuous part he played in 1896 in his capacity as Prof. Robert Koch's first assistant during the former's sojourn in South Africa for the purpose of investigating and

combating the rinderpest. In Germany, however, his name is associated with several other by no means less important scientific researches. In 1890 he began some special bacteriological studies under the superintendence of Prof. R. Koch, and in the following year the "Seminar für orientalische Sprachen" was founded in Berlin, and Dr. Kohlstock, upon Prof. Koch's recommendation, became lecturer on tropical hygiene at that institute. To his connection, as a teacher, with this institute he mainly owes the title of professor, which was conferred upon him by the German Government in 1898. But his activity and interest were not confined to this work alone, indeed his subsequent appointment as a scientific adviser to the German Foreign Office in matters bearing upon tropical hygiene very largely increased his usual work and brought him into public prominence, with the result that he was soon requested by several private colonial associations to accept a post similar in character to that he held in connection with the Foreign Office, but he declined these offers. His scientific and literary contributions are numerous, but they are entirely devoted to the domain of clinical and bacteriological research in connection with malaria and yellow fever. One popular book, however, which he wrote about two or three years ago, is likely to survive him for some time to come, namely, his "Aerztlicher Rathgeber für Ost-Afrika und andere tropische Malaria-Gegenden." Lastly, in conjunction with Prof. Koch he originated the scheme for the establishment of the so-called "Deutsche Anstalt für Tropen-Hygiene," which was recently erected in Hamburg.—*Nature.*

Egg Production.

Much of the progress which has been made in other departments of live stock and in cultivation has been due to careful selection, using only the most prolific as breeders or food producers for productive purposes. It is recognised that in cattle the right method of securing advance is by carefully observing results in the individual, and wherever the exceptional is met with, in early maturity, in flesh development, or milking properties, seeking to emphasise the special quality upon the progeny. Some of our most popular races first attained popularity in this way, and the efforts of breeders have been directed towards the maintenance or enhancement of a quality which was exceptional at the outset. In connection with plant life we have only to consult our advertisement columns or the catalogues of seedsmen to see that this aim is kept in view. The species or variety which gives the greatest return is certain to command the largest sale, and here again, by using the specially prolific, it is possible to enhance the returns. What is true in these branches of animal and plant life is equally possible in poultry culture, provided that the same steps are taken, the same

efforts put forth. Without observation and systematic breeding it is not to be expected that improvement will take place.

It is an undoubted fact that during the last 30 years considerable progress has been made in the average of eggs produced by our various breeds. I do not mean that exceptional productiveness could not be found then, for we have only to study our earlier publications to find records which proved great prolificness. They were, however, by no means so general as now, and it seems to be unquestionable that the average number of eggs laid by the common type of hen was a much lower one than is the case to-day over the chief part of the country. The type of fowl found, if type it can be called, was heavier than now, they were more frequent sitters, and generally of a more indolent disposition. The influence of the Mediterranean races has made for increased egg production, as has also that of the American breeds, and the bringing of artificial methods of hatching and rearing into practical operation has made us able to dispense with the early sitters necessary under former conditions. Thirty years ago the Leghorn was unknown in this country, or practically so; 20 years ago the Plymouth Rock had only been introduced, whilst in the early seventies there was no incubator which was sold at a price within the reach of most poultry-keepers, or could be relied upon to give satisfactory results under ordinary conditions. Sometimes these facts are forgotten by the younger generation of poultry-keepers. When we study the records of egg production in the 'fifties it is to conclude that hens producing more than 100 eggs per annum were few, and more than 120 per annum were very rare. Now it is by no means difficult to find records of flocks giving an average of 130 or even 150 per annum, with individuals upwards of 200 in the same period. These facts are undoubted to the candid mind, and show that the statements sometimes made that fowls were better and hens more prolific 40 or 50 years ago than now are incorrect. That further advance will be made we cannot question. In America, where the study of records is more frequently met with than in Europe, we find that one breeder has secured an average of 176 eggs in 12 months over a flock of 300 hens. This is a startling statement, but we have no reason to doubt it, coming as it does from a reliable source.

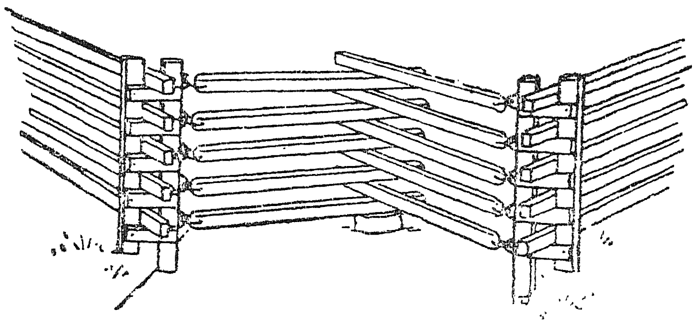
Rigid selection is a very important factor in improvement of any race or breed. What would be difficult in the case of a large flock is much more easy with a small number, as individual hens can be picked out, and their productiveness noted. Multitudes of breeders can tell us the eggs laid by every hen, and if they are observant they naturally select for breeding those giving the best results. This is one reason why hens kept in small flocks usually give a higher average of eggs than when massed together in large numbers. Of course, if time and thought can be given to the business, it is possible to do the same with the latter. But it requires both time and attention for its accomplishment. We must look, therefore,

chiefly to the small breeder to give us the birds which lay the largest number of eggs.

The system which is common on farms, namely, of running a lot of hens together with a sufficient number of male birds, will never make for improvement, as we cannot thus discriminate between the individual birds. Everyone should breed only from his best, and to do this selection should be made, picking out the hens which are known or believed to have laid the most eggs. One of these lots, which should each be placed in a house by themselves, mated with an equally-chosen male, will be enough to provide chickens to stock a poultry yard. From each pen of 10 birds we may reasonably anticipate obtaining 300 chickens between January 1 and May 31. Should half prove to be cockerels, and 20 per cent. of the pullets require to be weeded out, there will remain 120 pullets available as layers or breeders. It is only necessary to multiply the number of pens in accordance with our requirements if we desire to breed a greater quantity of pullets than here stated. Frequently by care and good fortune we can secure a couple of hundred pullets from 10 hens, but it would be unwise to reckon upon so many, and I prefer to understate rather than overstate my case. The great point in favour of this system is that we breed only from the birds selected for that purpose, and by so doing we are much more likely to attain the object in view. Supposing that we have 100 hens, and they average 100 eggs per annum, it is probable that a few are producing 130 each, whilst the many only give 70 or 80. As the latter leave no profit, for it may be reckoned that it takes 80 eggs per annum to pay the cost of rearing and feeding any hen, and as it is just possible that these may give early eggs, we cannot control or influence future progress, because we do not discriminate between one and the other. But if we pick out the hens which lay 130 eggs each, breed only from them, provided they are mated with a sympathetic male bird, we may hope to maintain this and improve upon it. It is in the way just named that we shall increase the average of eggs given by our fowls, for great fecundity is an individual quality rather than a family or racial characteristic. I do not mean that taking the general run some breeds do not lay more than others, but that improvement will only be secured by choosing those individuals which are the greatest egg-producers.

The first thing, therefore, is to induce our farmers to abandon their system of using all the stock as breeders, and to depend upon specially-chosen specimens for this work. Doing so may involve a little more trouble, and necessitate some personal observation, but no pursuit can be made successful without trouble and thought, certainly not poultry-keeping. We have much to learn and do in poultry-keeping, and it will be by the efforts of the many rather than the experiments of a few that we shall arrive at the desired goal.—*English Agricultural Gazette.*

Flood Gate.



GATE ACROSS STREAM.

The above illustration is from the *Australasian* and shows a style of gate or contrivance suitable for placing in a fence when carried across a small stream.

A fixed fence would be liable to be carried away in a flood by any accumulation of stuff brought down, while the gate above represented would open and let it pass. It is constructed of poles or rails which are held by interlinking staples to the posts at the sides of the stream. When the flood comes, the rails are washed from the centre and float freely on either side of the stream. They can easily be replaced when the water subsides.—EDITOR.

Imported Tobacco.

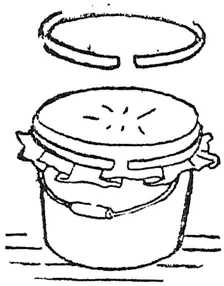
In a late number we noticed the increase in the importation of tobacco and that the total quantity was over one thousand tons.

The following particulars of the several kinds and the amount of duty paid may be interesting to our readers :—

RETURN SHOWING THE AMOUNT AND DECLARED VALUE OF TOBACCO IMPORTED INTO THE SEVERAL PORTS OF THIS COLONY DURING THE YEAR 1900.

DESCRIPTION.	QUANTITY.	VALUE.	RATE OF DUTY.	AMOUNT OF DUTY.		
	lbs.	£		£	s.	d.
Unmanf. & unstemmed	774,063	27,161	2s.	77,406	6	0
Unmanf. but stemmed	37,895	1,704	2s. 6d.	4,736	17	6
Manf. and Uncut ...	226,711	8,892	3s.	34,006	13	0
Manf. but Cut ..	302,519	25,187	3s. 6d.	52,940	16	6
Snuff	34	9	4s.	6	16	0
Cigars	223,485	73,816	6s. & 7½%	72,581	14	0
Cigarettes ...	637,696	171,837	4s.	127,539	4	0
		308,606		£369,218	7	0

Handy Milk Strainer.



The above illustration, which represents a plan for preventing dust and other impurities getting into milk during the operation of milking, is from the *American Agriculturist*. It is cheap and simple, and is made in the following way:—Get a wooden hoop a little smaller than the top of the milk pail, put a square of cheese cloth over the top of the pail and hold it in place by the hoop as shown.

The arrangement can be made in a few minutes and appears to be a very useful one. The cloth must be washed after each milking, when it will be ready for use again.—EDITOR.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. : —

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Picuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent..............................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers find them to be free from disease.

(Inspector's Signature..

(Address)..

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent......................

(Inspector's signature)..

(Address)..

Date...................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(a) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(b) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Applications for Advice or Assistance of Veterinary Surgeons.

Farmers and owners of stock throughout the Colony frequently telegraph to the Department of Agriculture requesting that one of the Government Veterinary Surgeons should be sent at once to them, to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time, may be two or more hundred miles away, and can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory, therefore, in all such cases in which Veterinary advice and assistance are required, if the owner would telegraph to the head office the nature of the complaint that the animal is suffering from, giving as full and accurate description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to send Veterinary assistance to the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these officers from and back to their residences, or nearest Railway or Post Cart Station.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

The third of the series for the year 1901 began on April 30th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

EAST LONDON. April 30.

Briton, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Scd.sup.	58	1	1
S<*>W	" "	10	1	0
	" "	6	0	11½
Baza	" "	37	1	0½
	" "	28	1	0
Lunda	" "	17	1	0
	" "	6	0	11½
	" " dam.	1	0	11
L&P	" "	1	1	0
	" "	1	0	10½
	" "	1	0	11

CAPE.

Briton, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl <HE>	sup.sn.-wt.ext.	14	1	5
Waverley Ms. M	" " "	6	1	4
	" " "	11	1	2½
	" "	11	1	2
	" "	4	1	1½
	sn.-wt.	1	0	8
CJM/KG	Grs.sup.	14	0	5
	" "	9	0	4¾

Dunottar, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl[WLS]	ext.sup.sn.-wt.	15 not sold		
TLT	Grs.sup.com.	83 not sold		

ALGOA BAY.

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
86 in triangle HL&Co.	sup.sn.-wt.ext.	40	1	2
[19] "	" "	25	1	2
	" "	2	1	0
87 in triangle HL &c.	" "	4	1	0

EAST LONDON

Saxon, Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed Swords	sup.sn.-wt.	81 not sold		

Mark.	Description & Ship.	Bales.	s.	d.
AWS	Grs.sup.com. ...	33	0	6¼
	,, ,, ,, ...	14	0	6
	,, ,, skt. ..	6	0	3¾
MEL	Flc.wsh.sup. ...	28	0	6¾
	,, ,, ,, ..	59	0	6½
YUS	Grs.sup.com. ...	22	0	5½
	,, ,, ,, ...	32	0	5¼
	,, ,, ,, ..	21	0	5

CAPE. May 1.

Garth. at Mossel.

Mark.	Description & Ship.	Bales.	s.	d.
PV&Co. Anchor	Grs.sup.com. ..	11	0	6¾
	,, ,, ,, ...	10	0	6¼
	,, lam. ...	10	0	6½
	,, lks. ..	16	0	6¼
	,, ,, ..	1	0	3¾
R&B	Grs.sup.com. ..	108	0	6¾
	,, ,, ,, ...	78	0	6½
	,, ,, ,, ..	9	0	6¼
	,, ,, ,, ...	45	0	6½
	,, ,, ,, ..	21	0	6¼
	,, ,, ,, ...	3	0	6
	,, ..	1	0	3¾
	,, blk. ..	1	0	4¼
	,, lks. ..	11	0	3¼
	,, lam. ..	30	0	6¼
	,, ,, ..	8	0	5¾

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
FHR V	Grs.sup.com. ..	3	0	6¼
	,, ,, ..	20	0	5¾
	,, lam. ..	1	0	6
	,, breech ..	1	0	3¼

Saxon, Kinfauns, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
B&Co.	Grs.sup.com....	32	0	6¼
	,, ,, ,, ...	31	0	6
	,, ,, ,, ..	30	0	5¾
	,, ,, ...	8	0	5¼
Paarl B&Co.	sup.sn.-wt.ext. ..	9	1	4½
	,, ,, ,, ..	36	1	4
	,, ,, ,, ..	30	0	3½
	,, ,, ,, ..	20	1	3
	,, ,, ,, ..	12	1	2½
	,, ,, ...	2	1	1½
	sn.-wt. ...	8	1	2½
	,, ...	8	1	2
	,, ...	1	1	0
	,, sup.ext. ...	12	1	3
	,, ,, ..	9	1	2½
	,, ..	1	1	0
	Scd. ..	5	0	11
	,, sup.coarse white	7	0	10
	,, ,, blk. ...	2	0	11
	,, ,, crse.coloured	2	0	8½
	,, ,, ,,	6	0	7½

Garth. at Mossel.

Mark.	Description & Ship.	Bales.	s.	d.
HV&Co. MB	Grs.sup.com. ...	41	0	6¾
	,, ,, ,, ...	13	0	6½
	,, ,, ,, ..	12	0	6
	,, ,, lam. ..	21	0	6
	,, ,, ,, ..	18	0	6¼
	,, ,, ,, ..	9	0	5¾
	,, fine blk. ..	2	0	4½
	,, crse ,, ..	2	0	4
	,, ,, ...	2	0	3¼
	,, lks. ...	7	0	2¾
	,, dc'd ..	2	0	5½
	,, ,, ..	2	0	5

Norman, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/CU	sn.-wt.ext.sup.	5	1	6
	,, ...	1	1	5½
,, [W] ...	,, ..	2	0	10½
,, [ ] ..	,, ...	4	1	0½
Waverley Ms./W	,, ..	20	1	1½
Paarl	.. ,, ext.sup....	10	1	6
SL	..Grs.sup.lam. ...	5	0	6
ML	,, ,, ..	1	0	6½
	,, ,, ..	4	0	6¼
	,, ,, ..	1	0	5½
	,, ,, ..	1	0	5

Garth. at Mossel.

Mark.	Description & Ship.	Bales.	s.	d.
MB&Co.	...Grs.lam. ...	4	0	5¾

Saxon, Dunvegan, Norman, &c.

Mark.	Description & Ship.	Bales.	s.	d.
FWS	Grs.sup.com.dam.	1	0	6
	,, ,, pcs. ..	4	0	4½
W in triangle A &c.	sn.-wt.sup. ..	22	not sold	
	,, ,, ..	8	1	3
W in triangle	..Grs. xbd. ...	4	0	5¼
[87]	.. ,, com. ...	3	0	6
HL&Co./JFS	sup.sn.-wt.ext.	20	1	2½
	,, ,, ..	1	1	0
89 in triangle HL&Co.	,, ,, ext.	25	1	1½
	,, ,, ..	1	1	0
96 in triangle HL&Co.	,, ,, ext.	26	1	1
	,, ,, ,,	25	1	0½
	,, ,, ..	3	1	0
HL&Co. [23]	,, ,, ext.	15	1	2½
	,, ,, ..	1	1	0
4 in triangle HL&Co.	,, ,, ext.	37	not sold	
	,, ,, ...	5	1	0
HL&Co. [21]	.. ,, ,, ext.	9	not sold	

EAST LONDON.

Norham, Saxon, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
SLC	..Grs.sup. ..	35	not sold	
MAL Cathcart	,, ,, com...	6	not sold	
	,, ,, ..	14	0	6¼
	,, ,, ..	14	0	6
XEL	,, ,, com.lam.	5	0	7¾
	,, ,, ,, ..	33	not sold	

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
B E L	Grs.sup.com.ext.	15	0	7½
	,, ,, ,, ,,	14	0	7¼
	,, ,, skt. ...	1	0	4
	,, ,, ,, dam.	2	0	4

Dunottar, Briton, Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
S(KN)W	sup.sn.-wt. ..	10	1	1½
	,, ,, ..	12	1	0½
Anchor	..Flc.wsh.sup. ..	13	0	7
IXL	..Grs.ext.sup.com.	25	not sold	

Tantallon, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
WAE	Grs.sup. ...	14	0	6
	,, ,, ..	6	0	5¾
KRE	.. ,, ,, ..	39	not sold	
MAL/Cathcart	... ,, ...	20	not sold	

Norman, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
M F G	Grs.sup.com. ..	14	0	7
	,, ,, ,, ..	19	0	6½
	,, ,, ,, ..	16	0	6¼
	,, ,, ,, ..	10	0	6½
	,, ,, ..	8	0	5¾
	,, ,, ...	7	0	5½
Anchor	..Flc.wsh.sup. ..	22	0	6¾

CAPE. May 2.

Carisbrook, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
SAS	Grs.com. ..	35	0	6
	,, ,, ..	35	0	5¾
TAG/Ta	,, sup.com. ..	20	0	5¾
	,, ,, ,, ..	9	0	5¼
,, JVD M	.. ,, ,, ,, ...	7	0	5½
,, JOD-N	... ,, ,, ,, ..	6	0	5¼
,, PJN	,, ,, ,, ..	15	0	5¼
	,, ,, lam. ..	4	0	5½
,, JE	,, ,, com...	19	0	5¼
	,, ,, ,, ..	11	0	5
,, DS	.. ,, ,, ,, ...	6	0	5¼
,, JC	... ,, ,, ,, ..	8	0	5¼
,, WJM	.. ,, ,, ,, ...	4	0	5
,, JA	... ,, ,, ,, ...	8	not sold	
,, JDS	... ,, ,, ,, ...	3	0	5
BAY	,, ,, ,, ..	11	not sold	
	,, lam. ..	4	0	4½

ALGOA BAY.

Norham.

Mark.	Description & Ship.	Bales.	s.	d.
90 in triangle HL&Co.	sup.sn.-wt. ..	8	1	1½
91 in triangle HL&Co.	,, ,, ...	23	not sold	
92 in triangle HL&Co.	,, ,, ..	41	not sold	
90 in triangle &c.	,, ,, ..	8	not sold	

EAST LONDON.

Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
GAL	Grs sup.com. ..	45	0	5½
	,, ,, ...	1	0	5¼
	,, com.sup...	38	0	5½
	,, ,, ..	4	0	5¼
PWF	..part wsh. ...	10	0	5¾
DOD	Grs.sup.com. ...	56	0	5½
	,, xbd. ..	2	0	3½
	,, dam. ..	1	0	5¼

Briton, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
MB AN	Grs.com. ..	40	0	5¼
	,, ,, ...	58	0	5½
	,, ,, ..	73	0	5¼
	,, ,, ...	69	0	5
	,, ,, ..	49	0	4¾
	,, ,, ...	24	0	5¼
	,, ,, ...	35	0	4¾
	,, ...	11	0	4½
Yukon	Scd.sup. ...	66	1	0
	,, ,, ..	41	0	11½
	,, ,, ..	44	0	11
Bomvana	,, ,, ...	19	0	11½
	,, ,, ...	18	0	11

Norham, Saxon. Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Scd.sup. ..	34	1	2
	,, ,, ..	25	1	1
	Flc.wsh. ...	77	0	6¾
Lunda	Scd.sup. ...	27	0	11½
	,, ,, ..	6	1	0
Baza	,, ,, ...	6	1	1
	,, ,, ..	35	1	0½
	,, ,, ..	13	0	11½
	,, ,, ..	9	1	0
L&P	,, ,, ..	4	0	11½
	,, ,, ...	1	0	11

Carisbrook, Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
C. Price	Grs.sup.com. ...	11	0	6¾
	,, ,, ,, ..	9	0	6¼
PB/WK	.. ,, ,, ,, ...	1	0	5¼
,, MX	,, com. ...	2	0	5¾
	,, sup. ...	1	0	5¼
,, AS	.. ,, ,, ...	1	0	4¾
,, WL	... ,, ,, ..	9	0	5½
,, WW	.. ,, com. ...	4	0	5¼
,, HM	.. ,, sup. ..	5	0	5½
,, TLT	.. ,, ,, com.	22	0	5¾

CAPE. May 3.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
[H]	Scd-sn.-wt.ext.sup.	31	not sold	

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
JR	Grs.com. ...	18	0	5½
L	,, ,, ...	22	0	5¼
	,, ,, ...	46	0	5
GWH	.. ,, ,, ...	15	0	5
HAR	,, sup. ...	15	not sold	
	,, ,, ...	15	0	4¾
	,, ,, ...	6	0	5
GH	,, com. ...	15	0	5¼
	,, sup. ..	9	0	5
	,, ,, ...	10	not sold	
HC	.. ,, blk. ..	4	not sold	

Norman, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
J.Kilfoil/FernD	Grs. ..	95	not sold	
WHJames/Toise	,, ..	22	not sold	
SRC/Caledon	.. ,, ext.sup.com	43	0	6½

EALT LONDON.

Scot, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
E(B)L	Grs.sup. ..	4	0	6½
	,, ,, ..	15	0	7
(KN)	sn.-wt.sup. ..	16	1	1
	,, ,, ..	29	1	0½
	,, ,, ..	8	1	0
KRD	...Grs.sup. ..	8	0	6½
XL	... ,, ,, com. ..	9	0	6½
WIN	... ,, ,, ,, lam	2	0	6
XEL	... ,, ,, ,, ..	29	not sold	

Gascon, Kinfauns, Tantallon, &c.

Mark.	Description & Ship.	Bales.	s.	d.
BON	Grs.sup. ..	11	0	6
	,, ,, ..	21	0	5¾
	,, ,, ..	1	0	4¼
SLC	,, ,, com. ..	8	0	6½
MAL/Cathcart	,, ,, ,, ..	30	0	6
	,, ,, ,, ..	10	0	5¾
IVY	,, ,, ,, ..	13	not sold	
	,, ,, ..	34	0	6
	,, ,, ..	16	not sold	
	,, ,, ..	18	0	5¾
	,, ,, ..	7	0	6
MER	... ,, ,, ..	16	0	5¾

Mark.	Description & Ship.	Bales.	s.	d.
SXM	Grs.sup.com. ..	7	not sold	
	,, ,, ,, ..	4	0	6½

Dunvegan, Briton, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
LUM	,, ,, ..	9	0	5¾
	,, ,, ..	7	0	5½
XLNT	,, ext.sup.com.	11	0	7
	,, ,, ,, ,,...	29	not sold	
XXC	,, xbd ..	22	0	5½
	,, ,, ..	9	0	5¼
R&Co	... ,, ..	8	0	4¾

CAPE. May 4.

Bundesrath.

Mark.	Description & Ship.	Bales.	s.	d.
HP/LP	...Grs.sup.com...	6	0	5¾
MP	... ,, ,, ,, ..	7	0	5¾
JD	... ,, ,, ,, ..	16	0	5½
JJP, HY &c.	.. ,, ,, ,, ..	15	0	5½
JL	.. ,, ,, ,, ..	9	0	5½
LVV, ADP	.. ,, ,, ,, ..	7	0	5½
JT	.. ,, ,, ,, ..	16	0	5½
PC	.. ,, ,, ,, ..	15	0	5½
PE, AG	.. ,, ,, ,, ..	7	0	5¾
MAP, OG &c.	.. ,, ,, ,, ..	15	0	5¼
GL	.. ,, ,, ,, ..	9	0	5¼
JP, JD	.. ,, ,, ,, ..	15	0	5
AF, OP &c.	.. ,, ,, ,, ..	11	0	5
CK, JLP	.. ,, ,, ,, ..	6	0	5¼
ML, JK	.. ,, ,, ,, ..	9	0	4¾
EN, GM &c.	.. ,, ,, ,, ..	8	0	4¼
IDP	.. ,, ,, ,, ..	4	0	4¾
MLJ	.. ,, ,, ,, ..	8	0	4½
WB, HJ	.. ,, ,, ..	5	0	5
JS, TR	.. ,, ,, ..	4	0	4¼
CSD	.. ,, ,, ..	2	0	4
TR, C&C	.. ,, ,, C C	3	0	3½
AG, JP &c.	.. ,, lam. ..	4	0	4¾
JJP, JT	.. ,, sup.com.dam	2	0	5¾
JK	.. ,, ,, ,, ,,	1	0	5¼

General.

Mark.	Description & Ship.	Bales.	s.	d.
NP, JT &c.	...Grs.sup.com. ..	9	0	5¼
JD, NP &c.	... ,, ,, ,, ..	9	0	5
MJL	... ,, ,, ,, ..	1	0	4¾
TR	... ,, ,, ,, dam.	1	0	4½

Norman, Raglan, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms.	sup.sn.wt.ext...	17	1	5¼
	,, ,, ,, ..	1	1	3½
JCE	,, ,, ,, ..	1	1	2½
OVP	,, ,, ,, ..	6	1	4
	,, ,, ,, ..	1	1	0½
OAP	,, ,, ,, ..	13	not sold	
	,, ,, ,, ..	1	1	0½
OMP	... ,, ,, ,, ..	13	not sold	
[O]	...sup. CaledonFW	7	0	10½
SRR/Caledon	...Grs.ext.sup.com	9	not sold	

ALGOA BAY.

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
WP	Grs.sup.com. ..	22	0	6¼
	,, ,, ,, ..	26	0	5¾
SAL	... ,, ,, ..	14	0	4¾
<B> 2	sup.sn.-wt.ext	41	1	2½
	,, ,, ,, ..	20	1	2

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
B W (2)	sup.sn.-wt.ext.	16	1	3
	,, ,, ,, ..	54	1	2½
	,, ,, ,, ..	70	1	2
	,, ,, ,, ..	11	1	0
8 in triangle HL & Co	sup. SW ext...	31	1	1½
6 in triangle HL & Co	,, ,, ,, ..	15	1	1
5 in triangle	,, ,, ..	34	1	1
	,, ,, ..	4	1	0
7 in triangle HL & Co	,, ,, ..	34	1	1
	,, ,, ..	2	1	0

Saxon, Gaul, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
W J Warren	Grs.sup.com-ext.	18	0	7¼
	,, ,, ,, ,,	17	0	6¾
	,, ,, ,, ..	9	0	7½
	,, ,, ,, ..	10	0	7¼
	,, ,, ,, ..	6	0	5¾
	,, skt. ..	1	0	4½
	,, ,, ..	3	0	3½
BB Cathcart	Grs.sup.light...	10	0	6
	,, ,, ,, ..	13	not sold	
	,, ,, ,, ..	6	0	4¾
WR	... ,, ,, ,, ext.	17	0	6½
(A)	.. sup.sn.-wt. ..	41	not sold	
(B)	,, ,, ..	20	1	1
	,, ,, ..	30	not sold	

Tantallon, Gascon, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
XLG	Grs.ext.sup.com	7	0	5¼
	,, ,, ,, ,,	38	not sold	
XSC	... ,, ,, ,, ,,	26	not sold	
VXL	... ,, sup.light ..	1	0	5¼
SBC	... ,, ,, com. ..	34	not sold	
NOR	... ,, ,, ,, ..	80	not sold	
TOM	,, ,, ,, ..	26	0	5¼
	,, ,, ,, ..	12	0	4¾

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 1st June, 1901, as telegraphed by the Civil Commissioners o the places respectively named, is published hereunder.

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb	M Mutton per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 10 6	0 18 6	0 18 0	0 11 0	0 12 6	0 12 0	0 15 0	0 11 0	0 18 0	0 1 0	0 0 9	0 0 9	0 1 6	0 5 0	£12 to £16	16/- to 18/-
Beaufort West .	0 14 0	0 18 0	0 13 3	0 12 0	...	0 12 0	0 16 0	0 9 6	1 0 0	0 1 0	0 0 8	...	0 2 0	0 3 0	£12 to £15	20/ to 22/6
Burghersdorp ..	0 10 0	...	...	0 8 6	...	0 10 0	...	...	0 9 0	0 1 9	0 0 10	0 0 7	0 1 6	0 4 6	...	...
Cape Town ..	0 10 6	0 12 6	0 10 9	0 8 0	...	0 9 9	0 10 0	0 11 9	0 19 0	0 0 5¼	0 0 7	0 0 7½	0 1 9	0 4 0	17 0 0	1 4 0
Clanwilliam ..	0 12 6	0 18 0	0 13 0	0 8 6	0 10 0	0 8 0	0 12 0	...	1 5 0	0 1 0	0 0 7	0 0 6	0 1 6	0 1 3	11 0 0	0 18 0
Colesberg ...	0 12 6	...	...	0 11 6	...	..	...	...	0 17 6	...	0 0 6	0 0 6	0 1 6	0 3 0	...	...
Cradock ..	0 11 0	0 13 0	...	0 9 0	0 12 0	0 12 0	0 15 0	0 17 0	0 10 0	0 1 3	0 0 10	0 0 7	0 2 6	0 3 0	11 0 0	1 2 0
Dordrecht ...	0 10 6	1 0 0	0 18 0	0 10 6	0 14 6	...	...	...	0 10 6	0 2 6	0 0 10	0 0 9	0 1 6	0 1 6	...	...
East London ...	0 12 6	0 18 0	0 17 0	0 11 0	0 9 6	0 15 6	0 18 6	0 11 0	1 2 6	0 1 6	0 1 0	0 1 0	..	0 2 6	22 10 0	1 3 0
Graaff-Reinet ...	0 12 0	1 0 0	0 14 0	0 12 6	...	...	0 16 0	0 15 0	0 12 6	0 1 6	0 0 8	0 0 7	0 2 9	0 4 3	£12 to £14	22 6 to 25/-
Graham's Town ...	...	...	...	0 10 0	...	0 9 0	...	0 10 0	0 12 0	0 1 2	0 0 8½	0 0 11	0 2 3	0 3 0	...	...
Kimberley ...	0 14 0	0 18 0	0 15 0	0 12 0	0 12 0	0 12 0	0 15 0	0 14 0	1 0 0	0 1 0	0 1 0	0 0 10	0 1 9	0 3 3	£15 to £18	18/- to 23/-
King Wm's Town	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Malmesbury ...	0 11 0	0 15 0	0 12 0	0 10 0	...	0 10 0	0 10 0	0 10 0	1 0 0	0 1 6	0 0 8	0 0 7	0 1 6	0 2 0	17 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lb.	B. Wheat. Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. Slaughter.	Q. Sheep. Slaughter.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 16 0	0 12 0	0 7 6	..	0 6 0	0 10 0	0 7 6	0 16 0	0 1 3	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg, Natal	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Port Alfred	...	...	...	0 11 9	...	...	...	0 9 0	0 9 0	...	...	..	0 2 3	0 2 0	...	...
Port Elizabeth ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	..
Queen's Town ...	0 12 0	0 17 3	0 13 3	0 9 6	0 11 0	0 16 0	0 15 0	0 12 0	0 14 3	0 2 6	0 0 8	0 0 7	0 1 9	0 3 0	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 18 6	1 3 6	0 17 6	0 14 0	0 15 0	...	0 13 0	0 18 6	0 18 0	0 2 0	0 0 9	0 0 9	0 2 3	0 2 6	...	...
Worcester ..	0 11 6	0 16 6	0 12 0	...	...	0 10 0	0 12 0	0 10 0	0 10 6	0 1 3	0 0 7	0 0 6	0 2 0	0 2 3	16 0 0	1 4 0

NOTE.—Returns have not been received from the Civil Commissioners of King William's Town, Port Elizabeth and Tarka.

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AGRICULTURE.

Reports and Prospects.

Alice, *June 1st.*—During the present month bitterly cold weather has set in, with heavy frosts at night. The veld, however, is looking fairly green, notwithstanding another visitation of locusts, which

appear to be breeding and depositing their eggs. In their present flying state it is impossible to destroy them. Stock are in fair condition, and with the exception of a few isolated cases of lung-sickness, no other disease reported. Kaffir corn and mealie crops have been most successful, surpassing any that have been known for years past. Natives will have abundance of food now for the winter. The rainfall for the month registered 1·07 inch, which is considered good for this time of the year. R. FERRIS, C.C.

Bedford, *June 11th*.—We have not had a good rain for some considerable time past; it is not, however, much needed. High north-west winds have prevailed almost daily for the last month. Stock generally are in very good condition, but the severity of the cold weather appears to be having a bad effect on them. Locusts have several times put in an appearance, but not in very great numbers. The mealie crop this season is the best reaped for the last five years, while lucerne has been grown with great success.
H. HEWETT, R.M.

Cathcart, *May 29th*.—Farmers have little to complain of at present in this district. Stock are in good condition and very free from disease. There were a few losses of cattle in the summer from redwater, but every year the disease seems less virulent, probably because the cattle are partly salted from previous attacks. Farmers on the higher parts of the district had enormous crops of oathay, which has been fetching an exceptionally high price. I think the potato crop will be an average one. Some hundreds of wagon-loads of forage and potatoes have been brought to Cathcart from the Bontebok Flats, but farmers are sadly handicapped for want of a railway, as just when they want all their labour and oxen to get in their crops, their servants and oxen are engaged in getting the previous year's crops away. As I write the snow is falling. A. FRANCIS.

Kokstad, *May 3rd*.—Owing to the late rains there is plenty of good grass for stock. The crops that are still standing are looking well, and there has been a large quantity of winter feeding put in. Stock for the most part are doing well, although a few cases of lung-sickness have been reported amongst imported cattle, or on farms where imported cattle have run. W. LEARY, A.R.M.

Maclear, *May 5th*.—The outlook for farmers in this district has somewhat improved during the past two months. Sufficient rain for agricultural purposes has fallen during the current month and there is abundant good grass for stock. Stock are in good condition and no diseases have been reported. On account of the late rains crops have been almost a failure, but, if frost keeps away, late mealies will mature. L. PINKERTON, A.R.M.

Matatiele, *May 8th*.—Since my last report light showers of rain which fell during the month were of great benefit to growing crops, and towards the close of the month there was a slight fall of snow

on the berg, in consequence of which the frosts have set in and will no doubt affect some of the late mealies and Kaffir corn, although I am of opinion that most of the crops are too far advanced towards maturity to be much damaged. Pasturage is still in excellent condition and stock of all kinds are looking well. A good number of cases of lung-sickness have been reported, and I attribute the cause for this outbreak to the fact that a large number of cattle were brought in from Basutoland, purchased or exchanged for horses for remount purposes, and in consequence farmers have been inoculating.

R. CUMMING, A.R.M.

Mount Ayliff, *April 30th.*—The crops are doing well and there is every promise of a fair harvest. The pasturage continues to be very fair and stock both large and small are in good condition. Lung-sickness is affecting two or three animals in a quarantined area, but it is not spreading. It was brought from Basutoland here. There is no other sickness among animals in this district.

R. HARRIES, R.M.

Mount Frere, *May 4th.*—Slight showers of rain fell at intervals during the last month, and freshened up the crops and veld; the former are looking well and a good harvest is anticipated. No frost has as yet made its appearance. Stock in general are looking well. Only one fresh case of lung-sickness has been reported, though the disease from which these cattle are suffering appears to be in a very mild form, a very small percentage dying. H. GARNER, A.R.M.

Peddie, *May 31st.*—A fair harvest has been secured, especially of Kaffir corn, of which there has been a good yield. There have been, and there still remain, some swarms of locusts, but so far they have done very little harm. Stock continue in good condition and healthy. A. PRESTON, A.C.C.

Prince Albert, *June 3rd.*—Fine showers of rain have fallen recently and have been pretty general in all parts of the district. The Zwartberg Mountains have twice this winter been covered with snow. There is therefore every prospect of a good sowing season, and the Gouph, generally, is in very good condition for sheep pasturage. Very few cases of horse-sickness were reported. All kinds of stock are in healthy condition. E. ANDERSON, C.C.

Qumbu, *April 30th.*—The month now closing has on the whole been a good one, and mealie and Kaffir corn crops are now fast approaching maturity. There are indications of an early winter, and, should frosts prevail soon, a large portion of the crops will fail. However, I still anticipate a plentiful harvest. Lung-sickness still prevails in the area placed under quarantine some months back, and alluded to in previous reports, otherwise the health of stock in the district is good. Pasturage is in first rate condition.

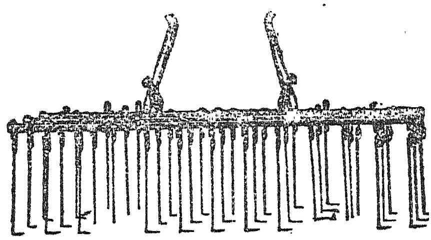
A. REIN, R.M.

Tsolo, *May 15th.*—Since my last report it has been very dry, in fact, no rain has fallen. Ploughing in this district was late, and heavy hailstorms passed over parts of the district, therefore we cannot expect a very good harvest, although there will be sufficient to keep the people from want. Cattle, horses and small stock are in good condition, with very little sickness amongst them.

W. Carlisle, A.R.M.

Umzimkulu, *April 30th.*—A good deal of rain fell in the first half of the month, but it was not general over the district, indeed that portion to the south and south-west is very dry and crops are poor in consequence; in other parts crops look well and promise a fair yield in the coming season. The veld is beginning to show the approach of winter, but there is no falling off in condition of stock; there is good grazing to be had in abundance. The past season was remarkable for the almost entire absence of horse-sickness in the district. There is no lung-sickness in existence; and with respect to scab, I believe one-half of the district is absolutely free from it, while very little exists in the other half. E. Whindus, R.M.

Weeders.



Eclipse Weeder.

This comparatively new kind of farm implement is very much used in the United States, and is found to do a large amount of effective cultivation, and when compared with ordinary ploughing in certain stages of soil and crops more culture with much less labour results. Amongst other good work they are specially adapted for killing weeds which too often spring up on a newly sown crop. Several acres can be gone over in a day, scratching the seedling weeds out of the ground to be killed by the sun. They are made of many different patterns and adapted to different uses.

The Eclipse Weeder is on a special principle, and we should, from the above illustration, think it would be likely to do good work. The teeth are adjustable and can be raised or lowered as required by the cultivation or state of the crops. The 39 teeth are made of spring steel, and while it tears up twitch grass and other like weeds it passes over any ordinary obstruction. This implement is useful in

getting up a fine tilth, and brushing in and covering up clover and grass seeds. There were some weeders in use in the Cathcart Division some years ago, and we shall be glad to get reports from farmers who may have used them.—EDITOR.

Emigration from Italy.

We are indebted to the courtesy of the Parliamentary Librarian for the appended statistics, which are interesting as showing the destination of the Italian emigrants who have left their country during the past six years. They may be taken as supplementary to the report we recently published on the "Suitability of Italian Agricultural Labour for Employment in the Cape Colony."

Numbers of Emigrants from Italy to various parts of the world, according to Italian statistics:—

	1894.	1895.	1896.	1897.	1898.	1899.
Europe ..	110,759	105,273	109,928	125,310	144,528	162,899
North Africa ...	2,390	3,063	3,227	2,457	3,251	4,566
United States ...	31,668	37,851	53,486	47,000	56,375	63,156
Canada ..	805	783	397	139	328	1,021
Mexico, &c. ...	1,204	1,688	1,816	1,783	1,025	1,267
Brazil ...	41,628	98,090	76,665	80,984	38,659	26,754
Chili and Peru ...	192	461	669	770	260	408
The Argentine ...	34,383	43,484	58,004	39,538	36,793	46,648
America (part not named) ..	1,579	1,562	1,961	1,080	1,753	860
Other Countries...	717	926	1,329	794	743	940
	225,323	293,181	307,482	299,855	283,715	308,339

Cultivation of Sugar Beet in New Zealand.

In connection with the article on Sugar Beet Culture which appeared in this journal of 8th February, 1894 (No. 3, vol. vii. p. 51), the following information received from the Department of Agriculture, Wellington, New Zealand, in reply to enquiries made by this Department, is published hereunder:—

"The growing of sugar-beet in New Zealand has not been a commercial success; it has, however, never been tried on an extensive scale. The chief difficulty here is the costliness of labour.

"The varieties grown in this country yield a good percentage of sugar, averaging from 8 to 14 per cent.; those giving the best results being Klein Wanzleben, improved Vilmorin and White French.

"The Victorian Department of Agriculture has made extensive experiments in connection with the growing of sugar-beet, and, no doubt, could afford you valuable information on the subject."

An enquiry is being addressed to the Agricultural Department, Victoria, in regard to this matter, and the result will be published in due course.—EDITOR.

New Steep for Cereals.

In a bulletin issued by the Agricultural Experiment Station of the Wisconsin University the following particulars are given of a new material to be used for steeping seed oats and other cereals when sown. Formaldehyd gas in solution is the material which has long been used for protecting botanical specimens and other like purposes, but its use as a grain steep is a new application, and appears from the description given below to have been found very successful. That smuts of both kinds may be prevented by the use of a steep is a world-wide experience, and for this purpose sulphate of copper solution has scarcely or ever failed. Of this new steep we read:—

"Smutted plants grow from good seed, and take good plant food from the soil, returning a crop of spores to infect the seed grown by the healthy plants, and thus to predispose the following crop to smut.

In this bulletin we offer to the farmer an effectual, cheap and easily applied preventive of smut in oats, barley and wheat.*

The amount of damage from the smuts.—On this point we have little accurate data for our own State, but this little is sufficient to show that, where seed is not treated, the amount of smut varies greatly in different fields and in different seasons. During the season of 1900 the average percentage of smutted oat heads in four fields, located in Columbia, Dane, Iowa and Walworth counties respectively, was 6.2. In other words, something over six heads out of each hundred were destroyed by smut.

A count made at our Station in 1897 showed 10.2 per cent. of smutted oat heads, and a count made in 1889 showed .055 per cent. of smutted oat heads. An average of the six counts, made in three different years and from four different counties, shows with untreated seed a trifle less than 6 per cent. of smutted oat heads. It is well known, however, that the loss is often much greater than this—sometimes amounting to more than 20 per cent. of the whole crop.

The Wisconsin oat crop of 1898 was estimated by the U. S. Department of Agriculture at 64,000,000 bushels, valued at $15,500,000 (£3,125,000). Allowing an average loss from smut of five per cent., which is probably not an excessive estimate, the smut tax of 1898 in our State amounted to about $775,000 (£161,458).

*There are two smuts of wheat, one of which is known as the "stinking" smut and the other as the "loose" smut. The first-named disease is prevented by the treatment prescribed in this bulletin.

The nature of the smuts.—The smuts of the small grains are due to fungous parasites, *i.e.*, minute plants that grow and multiply inside of the grain plants, coming to maturity in the kernels. The soot-like dust forming the so-called smut is composed of the spores of these minute plants, and these spores propagate the disease as the seeds of weeds propagate weed plants. The spores cannot live through the winter in or upon the ground, hence a crop can only be infested with smut from live spores that adhere to the seed grains and are sown with them. It follows that if we treat the oats used for seed before sowing with some substance that kills the smut spores upon them, our crop will be free from smut.

Preventive methods.—Various methods have been used to prevent smut in the small grains, but the method now acknowledged to be best is that known as the "formaldehyd" treatment. This consists in sprinkling the seed with a 40 per cent. solution of formaldehyd gas, according to the directions given on the next page of this bulletin.

Formaldehyd is a colourless, pungent gas obtainable from wood alcohol and readily soluble in water. It may be purchased at drug stores in liquid form, that is, dissolved in water. Its property of destroying the spores of fungi was discovered by the German scientist Loew, in 1888. It is not poisonous in moderate amounts, even when taken internally. In 1895 Prof. H. L. Bolley, then of Indiana but now of the North Dakota Experiment Station, began making experiments with a solution of formaldehyd for the prevention of grain smuts and potato scab. His results were so satisfactory that the formaldehyd treatment has come to be regarded as the standard preventive for these diseases.

Does it pay to treat grain to prevent smut?—Suppose a farmer raises 25 acres of oats, and receives a yield, without treating the seed, of 40 bushels per acre. His crop would be 1,000 bushels. Suppose 5 per cent. of the heads in this crop were destroyed by smut. His crop would have been a fraction over 1,052 bushels had he prevented the smut. In other words, he would have received 52 bushels of oats for treating the seed. If oats are worth 25 cents per bushel, the gain would have been $13.00 (£2 14s. 2d.). How much would it have cost to treat the seed? The account would stand about as follows:—

Dr.			*Cr.*		
To one pound formaldehyd	$.60	(2s. 6d.)	By 52 bu. oats at 25c	$13.00	(£2 14 2)
To 4 hours work at .15......	.60	(2s. 6d.)	Less cost of treating	1.20	(5 0)
			Net profit ...		
Total	$1.20	(5s.)		$11.80	(£2 9 4)

How to treat the seed.—Buy, at a drug store, one pound of 40 per cent. formaldehyd for every 50 bushels of grain it is desired to treat. Ascertain at once if your druggist has it, to give him time to procure it if he has not. Pour one pound of the formaldehyd solution into a barrel containing 45 gallons of clean water. Then place a layer of grain three or four inches thick on the barn floor and sprinkle this with the solution until all the grains are entirely wet

A garden sprinkler is good for this work. Then place another layer of grain on the first layer and sprinkle as before, repeating the process until all the seed has been sprinkled. Leave the grain in the pile two hours, then spread out thinly to dry. It should be shovelled over once or twice a day until dry. If it is to be sown broadcast it is not necessary to dry it.

Corn (mealies) smut cannot be prevented by treating the seed corn, as the disease is of a different nature from the other grain smuts.

In case more grain is treated with the formaldehyd solution than is needed for sowing, the excess may be safely used for feeding by mixing it with ten times its bulk of untreated grain.

Formaldehyd for potato scab.—Formaldehyd may also be used to lessen damage from potato scab. Immerse the unsprouted and uncut seed potatoes for two hours in a solution made by adding one-half pound of 40 per cent. formaldehyd to 15 gallons of water. If the tubers are deeply scabbed, extend the time to three or four hours. After treatment, cut the tubers in the usual manner. They may be handled freely without danger. The same solution may be used five or six times in succession if the treatment is continued a little longer each time.

Do not use the potato solution for grain smut, as it is too strong, nor the grain solution for potatoes, as it is too weak."—EDITOR.

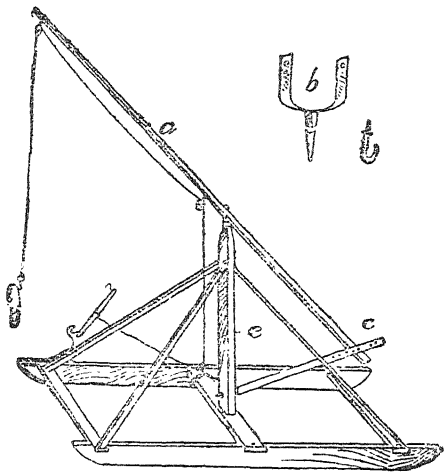
The Disc Plough.

A correspondent at Cathcart has favoured us with the following particulars of a new plough, on the disc principle, which appears to have answered satisfactorily :—

"Every year agricultural methods are improving, the ground better cultivated, and farmers availing themselves of improved labour-saving machinery. Lately there was an interesting trial of ploughs by the firm of Malcomess & Co., of East London, at which an entirely new departure in the plough line was tried. The new plough had no mould board, landside or share, but simply a large disc like the disc of a "Disc" pulverizer. As the plough went on, drawn by six oxen, the disc revolved, cutting a deep furrow some 16 inches broad, pulverizing the ground and throwing it very evenly. It was tried on very hard ground and through thick un-ploughed long grass, and did work a mould board plough would not do. If it came to a large stone the disc simply rolled over it like a wheel instead of catching as a share would do. It was greatly admired, and unless I am very much mistaken the "Disc" plough is going to be the plough of the future as it does the work well, is light and simple in construction, with no complicated parts easily broken or to get out of order. It was a single disc, but double discs are also manufactured."

We shall be glad of further accounts of its successful working. —EDITOR.

Harvesting Derrick.



HAY DERRICK.

Amongst the various farm implements which have been invented to facilitate work and relieve manual labour by the substitution of horse power, the hay derrick is appreciated and found most useful.

Pitching up hay from a wagon, when the stack gets high, is decidedly hard and often hot work, and can be done, of course, much more quickly with a hay derrick. These machines or implements are made by agricultural implement makers of different sizes and forms, but a correspondent of an American agricultural journal thus describes the way of constructing a home-made one like the above illustration:—

"The base of this derrick should be made of 3x12 stuff, 14 ft. long, the centre crosspiece of 3x8 and the outside cross-pieces of 2x8, all mortised in as shown in cut and securely bolted, one bolt at each corner passing through foot of brace, which should be made of 4x4 stuff. The post, *e*, may be either round or square (if square 8x8 is none too large), and should be 9 or 10 ft. high.

The pole, *a*, should be 35 or 40 ft. long, depending upon size of stack or rick to be made, and should be of good stiff timber. White oak is good, and seasoned elm first-class. Slab off butt end to save handling unnecessary weight. Have your blacksmith make a fork, *b*, and fit in old buggy spindle on top of post for fork to work in. The piece, *c*, is made of straight-grained 2x5, hinged to post and bolted to pole. The two hooks for pulleys are made as illustrated to bolt through pole and short end to enter shallow hole to prevent pulley jumping off.

The derrick should be set to the windward of the stack, and if it does not swing over stack when load is clear of ground, tilt the far

corner a little by putting block under it. If properly made and used it will be a valuable addition to the haying machinery for those who stack their hay in the meadow. The writer stacked 10 acres of good clover last year in a little over half a day with no one else on the stack from beginning to finish. You would never dream there was so much hay in the stack, it was so well packed by the dropping of the heavy load."

It may be said that we do not make and stack grass hay, but that we believe is to come; besides which, a derrick would be useful for making other stacks. Horses soon get to understand their part of the business, and to them it is light work; and the hay goes up, as the correspondent found, most merrily.—EDITOR.

STOCK FARMING.

Mohair Farming.

In relation to the slow and unsatisfactory state of the mohair trade, an Angora farmer writes :—

"My opinion is that the merchants, or rather produce buyers, are to blame for the decline in the price of mohair. They have had one uniform price and made no distinction according to quality. To instance my own case, I used to remove all stained hair and skirt heavily. I received the same price per lb. as the farmer who chucked his fleece entire into the bale, and for the skirtings 3d. to 5d. per lb. This did not pay. In the next place, a great number of our breeders have gone in for increasing the weight of their fleeces and, I fear, have sacrificed quality. I speak with a certain amount of diffidence about the oily goat as it is only a casual acquaintance of mine, but, as far as my knowledge goes, these goats after they pass their second year begin to be kempy and gradually get worse as they grow older. A few years back a friend bought a ram just for his size. When I pointed out this animal's defects he said, 'What does it matter? I get the same price for my mohair as you do, and I shall have fine big wethers.'"

Grass Fires and Loss of Sheep.

A correspondent writes from Pretoria :—

"Great grass fires have been raging through the Orange River Colony and the Transvaal, and for miles the country is a blackened waste. North of Pretoria some of the mealie crops are burnt, and authorities predict a corn and grass famine for the next two years. One thing that is noticeable from the moment you get across the Orange River, to as far north as Warmbad, is the number of dead sheep lying about all over the veld. I passed through from Orange River to Johannesburg in daylight and I estimated I passed 6,000 dead sheep in that distance, and this in the immediate vicinity of the railway line. The sheep I am told have died from cold. The agricultural prospects of the new Colonies are certainly not very promising at present."

As there has been since the rains a good growth of grass in many parts of the country, it is all-important that special measures should be adopted as may be divined best in preventing the spread of grass fires and carefully providing for the protection of homesteads.—EDITOR.

Salt Bush (*Atriplex semibaccatum*).

During a recent visit to Koondrook and Cohuna, where the dairying industry has been revived, Mr. H. W. Potts, Government dairy expert, was surprised to find cattle in very good condition at this period of the year, as the rainfall in the northern part of Victoria since the new year has been very slight. Grass was scarce, and on inquiring into the question of feed he found that it had been replaced by salt-bush, on which the dairy cattle thrive and are yielding good milk returns. One variety—the half-berried salt-bush, known as *Atriplex semibaccatum*—was found to be growing with wonderful luxuriance. It is a slender perennial plant with soft herbaceous stems spreading densely from a sturdy tap-root, and growing in prostrate form. In colour it is dull pale green and mealy white. One full-grown specimen, well fruited, was secured by Mr. Potts. It had a strong fleshy tap-root 1½in. in diameter, which had evidently descended to a great depth to secure moisture. This single plant covered completely a circular area over 7ft. in diameter. The plant is found in all the Australian states right to the interior, and is especially noted for its drought-resisting power. Sheep are very fond of it, and eat it down so closely that it is fast disappearing from the central plains of Australia. It has been of great value in the wool-producing areas, and Mr. Potts thinks that it is likely to be of considerable service to the dairying industry,

which is fast spreading through the northern districts of Victoria. To secure its maximum value it will, he says, be necessary to cultivate it in the way so successfully practised in California. On the dairy farms there will be no difficulty in doing this in the absence of sheep. The plant is well adapted for the dry areas along the Murray and in the Mallee country. It produces seed in good quantities, and it germinates readily under ordinary circumstances if sown after rainfall in autumn or spring.—*Australasian.*

Chilian Horses.

A Chilian military journal (the *Revista de Cabballeria*) gives an account of a long-distanced ride recently accomplished by a party of Chilian cavalry officers, which is interesting, as showing the endurance of horses of pure Chilian breed. Twenty-one officers took part in the ride, mounted on their ordinary chargers. On the first day 81 miles were accomplished; a like distance on the second; and on the third 88 miles, making a total distance of 250 miles in three days. The route lay along very bad roads, over a mountainous country, a height of over 3,000ft. above the level of the sea being reached.—*Australasian.*

The Slump in Wool.

Under the above heading, the *Weekly Press*, Christchurch, New Zealand, contains the following article dealing very intelligently with the decrease of fine wools and their exceedingly low prices:—

" A very interesting and well-worked-out article on the position and prospects of the Australian wool trade appears in the March number of the *Australasian Insurance and Banking Record.* Seldom have the ups and downs of this particular branch of commerce been more vividly exemplified than during the last twelve months or so. In January, 1900, the price of wool had risen to an extraordinary height, with every prospect, according to the best authorities, of a continuance for a year or so. Now, we are told, Australian crossbred wools are at absolutely the lowest level ever known, and merino wools are within about 10 per cent. of the lowest point. In one year, the price has dropped, in round numbers, £10 a bale. In January, 1900, super sixties tops in Bradford were quoted at 32½d., on March 14th last they had dropped to 18¾d.

What makes it all the worse for the Australian pastoralists, is that simultaneously with the decline in price, there has been a great falling-off in the clip. The total production for 1899 of Australia and New Zealand was 1,600,000 bales, as against 1,675,000 bales in 1898, thus showing a *decrease* of 75,000 bales. For 1900 the clip is estimated to be about the same as in 1899. It is more than 300,000

bales less than the output in 1894, and 379,000 less than that of 1895. Taking the clip this year as being the same as last, the *Record* estimates that the clip of 1900 will realise about £17,600,000, or £8,500,000 less than did the 1899 clip, similar in size. This is not a very joyful fact for speeches dealing with the inauguration of the new Commonwealth. To find an Australasian clip worth only £17,600,000 we have to go back fourteen years, to the clip of 1886. So far as New Zealand is concerned, it is satisfactory to note that the 1899 clip showed an increase of 2,000 bales as compared with that of the previous year, but, of course, we share with our Australian brethren the "doleful dumps" of low prices.

It naturally becomes a subject of great interest to enquire, first, what is the cause of the falling off in quantity; and, secondly, why prices are so low? The former is easily accounted for. It is due to drought—particularly in Queensland. During 1900 the colony was visited by "absolutely the worst drought ever known before by white men." The result is that out of 15,226,479 sheep alive at the end of 1899, it is believed that there could not be much more than 8,000,000 alive at the end of 1900. The sheep of Australasia, it is estimated, have fallen in eight years from 124,500,000 in 1891 to under 93,000,000 in 1899, and the number at the end of 1900 it is believed will be considerably less—perhaps not more than 90,000,000.

The cause of the decline in prices rests a little more on conjecture. The theory of the writer in the *Record*—and it seems to us a very sound one—is that the great cause is that the previous rise was too high. There was in 1899 every justification for a moderate rise, but as a matter of fact wool was "boomed" to an extent hardly ever before experienced in the history of the trade. In one year merino wool rose in value about 70 per cent. "Two results followed this "great rise. One was that a large number of firms found that they "had bought more wool than they could comfortably pay for, and the "other was that the great rise in the prices of manufactured goods "checked consumption. These two combined made it impossible "for the rise to be maintained, and the reaction set in. Not only "has the rise of 1899 been entirely lost but we are now down to the "level of four years ago." With the severe lesson which has been administered to the wool trade during the last twelve months, it is not at all likely that another "boom" will be engineered for some years to come. Prices, however, are now so low that it seems impossible to fall any lower. On the contrary, following the general rule, the low prices ought to stimulate consumption, and this, combined with the lessened output, ought to bring about a recovery in prices. Seeing that the prosperity of Australasia is largely bound up with the prosperity of the pastoral industry, it is to be hoped that a rise will not be long deferred."—Editor.

Decreased Wool Production.

Messrs. Helmuth, Schwartz & Co., of London, in their circular, give the following statistics of imports of Australasian, Cape and River Plate wool into Europe and North America for the past ten years:—

Year.	Australasian.	Cape.	River Plate.	Total.
1891	1,683,000	322,000	380,000	2,385,000
1892	1,835,000	291,000	415,000	2,541,000
1893	1,775,000	299,000	414,000	2,488,000
1894	1,896,000	256,000	443,000	2,595,000
1895	2,001,000	269,000	513,000	2,783,000
1896	1,846,000	288,000	543,000	2,677,000
1897	1,834,000	274,000	550,000	2,658,000
1898	1,703,000	279,000	555,000	2,537,000
1899	1,641,000	267,000	540,000	2,448,000
1900	1,456,000	140,000	468,000	2,064,000

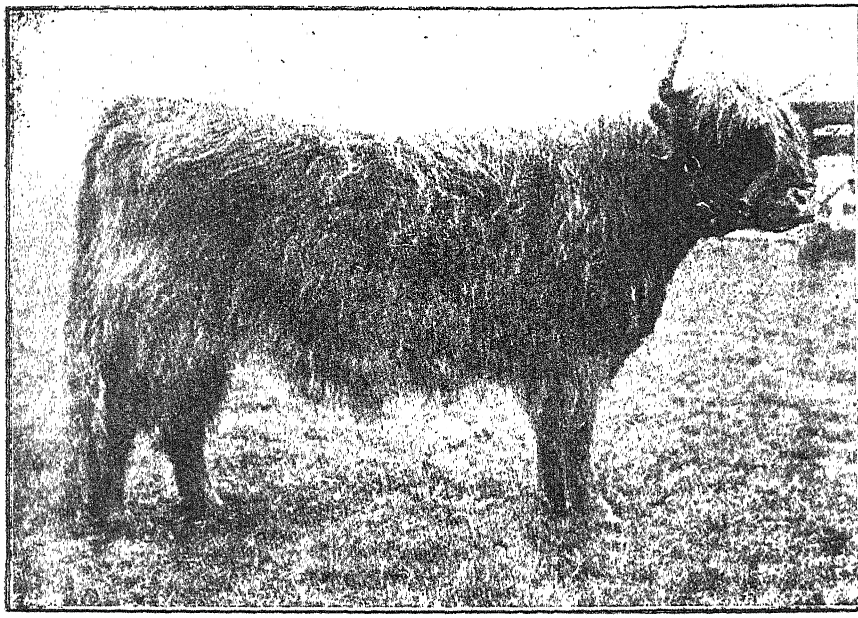
The above quantities are given in bales and show in the ten years' total a decrease of over three hundred thousand bales (321,000 bales), or reckoning the bales at 250 lb. each only the decrease is over eighty million pounds, being considerably more than our entire Cape export. Now, the question has still to be answered, Why does not the price improve?—Editor.

Polled Angora Goats.

A correspondent of the *Oregon Agriculturist* writes:—"I see that some of your subscribers have been asking for information about Polled Angora goats. As I have been raising them for a few years, perhaps a few words from me on the subject may interest your readers. In the first place, no doubt they were originally a sport. That is the way most polled breeds of cattle originated. Yet the polled Angoras breed so true to type I believe they can well be called a distinct breed. Polled does will in every case drop polled kids, and a well-bred polled buck will drop the horns off 80 per cent. of his kids from horned does.

My experience with Polled Angoras is that they have heavier bodies, shorter legs, and are altogether a better mutton breed than the horned Angoras, and at the same time more quiet and not so hard to fence. Hence, I am sure that they are the coming breed of Angora goats."

West Highland Cattle.



West Highland Heifer, Crunneag 6th of Ardtornish.

This heifer, the property of Mr. T. V. Smith, Ardtornish, Morven, Argyleshire, took the first prize and championship of the breed at the late Royal Agricultural Society's Show.

The illustration is taken from the *Live Stock Journal* and gives a good idea of the style and character of this breed, and is a striking object lesson on the effects of climate on various breeds of farm stock. In reply to the question, What is the best breed of cattle? the intelligent answer was first, What are the conditions of your farm? For on a well-considered report of these conditions both as to soil and climate more depends as to the proper answer and advice than anything else. The West Highland cattle, according to "survival of the fittest," and the adaptation which is induced, live and flourish. They are exceedingly hardy, ready feeders, and make capital beef.

To meet the conditions of cold and rain, and western gales, Nature has provided them with good thick, long, cold-resistent coats of hair; for, of course, this breed did not come to their present habitat thus provided, but is the work of some generations. Though it is a prominent example of the effect of climatic conditions, yet all districts and farms have their specialties, and the stock-owner does well to study them and take them into account in stocking his farm.

noticed in the article on Galloway cattle, that their hides were in America furnishing a substitute for buffalo robes, and we should think the Highlander's coat might be used for the same purpose.—EDITOR.

VETERINARY.

Acute Disease of the Joints of Young Animals.

Affections of the joints of foals, calves, lambs and kids, accompanied by swelling pain and stiffness, is very common where breeding operations are conducted on a considerable scale. It usually occurs a short time after birth, from seven to twenty days. It may appear in isolated cases only, or it may spread rapidly, affecting a large proportion of the young animals in a herd or flock.

This affection of the joints of young animals has received a number of names, and has been attributed to a variety of causes. It has been called rheumatic inflammation of the joints, said to be caused by exposure to wet weather, or by the animals being kept in damp and unhealthy situations. It has also been termed scrofulous disease of the joints, and attributed to some unhealthy condition of the mother injuriously affecting her milk. It received the name of "Navel-Ill," from the fact that the navel and the blood-vessels of the cord were observed to be more or less affected in this disease. In fact, it was the unhealthy condition of the blood-vessels and tissues of the navel which led to the discovery of its origin, viz., the entrance of infective organisms into the system through the blood-vessels of the open navel at or immediately after birth.

"The cord passing through the navel is made up, amongst other matters, of vessels which in the womb carry the nutritive blood from the mother to the fœtus, and the used-up impure blood from the fœtus to the mother. At birth this cord is severed, and the blood flow stopped by a clot which forms in the vessels. Soon after separation the end of the cord shrivels, and the aperture through which it passes heals up. The extremity of the cord in the navel dies, and under favourable circumstances becomes absorbed. Conditions which favour the absorption of the dead part hasten the closing of the navel, so that, in the healthy new-born animal, there is a natural process to prevent the entrance of injurious matter through ... It is well known to physiologists and pathologists that any- ... which retards the natural healing process favours the growth ... obes there, and affords a means for their entrance into the

blood-vessels which distribute them through the system."—(Prof. Penberthy.)

Anything, therefore, which exercises a debilitating influence on the newly-born animal, such as premature birth, a feeble and debilitated condition of the mother, due to improper feeding previous to parturition, would tend to retard the healing and closure of the navel, and the fact that a larger proportion of such cases occur in males than in females indicates that the dribbling of urine in the male to some extent interferes with the healing process.

But all such conditions, though important as predisposing causes, are not the originating cause of the disease, that being due to a special microbe which usually settles at the navel before it is closed, and grows and multiplies in the clot in the broken end of the vessel. It is then carried away by the blood stream and distributed to various parts of the system, amongst other places particularly selecting the joints, but the liver and other internal organs are often involved. In the capillaries of the organ or tissue in which the microbe is arrested, it sets up inflammation which results in the collection of quantities of matter of a peculiar character. In addition to this local effect there is the production of a debilitating fever and other systemic effects.

It is further evident that the affection is contagious, and may therefore be introduced into a herd or flock by an affected animal.

Symptoms.—"The more prominent symptoms are associated with the joints or the navel. Before swelling in these situations is appreciable it may however be noticed that a few days after birth the young animal has great difficulty in moving, is more or less lame, and manifests the indisposition to move by constantly lying down or standing in one position. Debility is evident, sucking is not carried out vigorously or continued, appetite is sometimes absent, and the little subject is tucked up, the coat becoming dry and harsh. There is often a slight discharge from the eyes and nostrils. The navel is generally swollen, open and discharging matter; and though sometimes it is healed on the outside, its neighbourhood is inflamed. In the course of a few days at some of the joints or other external parts there are noticed hot and painful swellings which assume a considerable size. Any joint may be affected, but it more frequently happens in the hock, stifle, hip or knee, In lambs more rapidly than in calves or foals it becomes evident that in these situations abscesses have formed which sometimes burst and discharge a peculiarly unhealthy-looking material. The loss of flesh at this stage is very marked. From the commencement the breathing is hurried, and with the progress of the disease it becomes more and more disturbed, shorter, quicker, and sighing. This disturbance is often very marked and the subject is deemed to have taken a 'chill.' The pulse, at first small and quick, becomes weaker and weaker, till it is scarcely perceptible. Occasionally in the early stages diarrhœa is a prominent feature; this however may not make its appearance until the disease is advanced, but sooner or later it is observed in most

cases. The temperature is raised, proving the febrile nature of the affection."—(*Ibid.*)

As a rule the symptoms are manifested from 7 to 20 days after birth, and the disease runs through its course in from 7 days to 3 weeks. Sometimes, however, the patient dies within 3 days of its being noticed to be ill. In such cases the symptoms are acute, and death may occur before abscess formation at the joints. The course may be prolonged, and some subjects "hang fire" for months, though this is the exception. There will naturally be variation of the symptoms, dependent to a great extent on the parts involved in the local changes set up by the germs after entering the body.

On *post-mortem* examination there is generally discovered evidence of the disease having resulted from affection of the navel. Though usually open, this may be found healed up on the outside. On the inside, the vessels frequently contain very dark blood, and unhealthy, sometimes putrid matter, and about the end of the cord abscesses may have formed. In calves and lambs most commonly through the veins, and in foals through the arteries, the germs having been distributed to various parts of the body, and becoming arrested in some, set up inflammation, and formation of matter there. In all very young animals, the joints would appear particularly favourable to these processes, and in animals dead of this affection are found in and about the joint collections of matter, and evidence of destruction of essential parts of the joints, the lining membrane which secretes the "joint oils," the cartilage covering the ends of the bone, and the bone itself. Sometimes the quantity of matter is very great, and bursting through the structures enclosing the joints finds its way into the sheaths of the tendons, &c. Any part of the body may give evidence of a similar process; the lungs, the chest cavity, the liver, kidneys, the glands, the cavity of the abdomen, and the brain are common seats of abscesses.

Curative measures are not very hopeful after the poison has entered the system. Attention should first be given to the navel, from which all unhealthy matter should be removed and the part thoroughly cleaned and dressed with a disinfectant, and if any secondary swellings or abscesses occur in non-essential parts of the body, these should be opened and cleaned and disinfected in a similar manner. It is in preventive measures, however, that most success is likely to be attained, and these consist first in being careful not to introduce an affected animal into a flock or herd; and in the prompt isolation of and the thorough destruction or disinfection of all beddings, &c.

Further, all the young animals that may have been in contact with an affected one should have their navels cleaned out and dressed with a disinfectant solution.

The next consideration is cleanliness. All boxes into which mares are placed to foal and remain with their foals, should be thoroughly cleaned and disinfected previously. And where the disease has appeared all foals or calves when born should have their cords and navels washed with a disinfecting solution, after which the cord

should be tied with a string which has been steeped in the same solution so as to prevent the absorption of the infective germs. And those who attend to the affected cases should not be allowed to come near the healthy. This disease is most prevalent in this Colony amongst our more valuable herds and flocks, which are housed and kept more or less under artificial conditions, but it occasionally occurs amongst flocks of sheep and goats that graze on the veld, but lamb or kid for the most part in kraals. Under such circumstances when the disease appears the affected lambs or kids with their mothers should at once be removed from the flock, and the remainder of the ewes placed in a new or clean kraal and grazed on a different part of the farm. Too little attention is given to preventive measures, in dealing with the several infectious diseases which affect our flocks and herds in this Colony.

D. HUTCHEON, C.V.S.

Treatment for Broken Wind.

A writer in an American paper thus gives what he finds to be the proper treatment for a broken-winded horse :—

"I wonder whether anyone has had a broken-winded horse or mare which has recovered. I have an aged mare, which, five or six years ago, was so 'gone' in the wind, that, after a trot in harness of two or three miles, she was in a hopeless state of collapse; she coughed violently, and her sides heaved with the peculiar 'double blow' indicative of the disease. After a continued treatment on specially prepared diet, consisting of chopped hay, crushed oats and bran, given well damped with water, and no long hay, she has lost all her cough, and there is no appearance of distress from the heaving of the flanks. She can trot along quite comfortably, and do eight to ten miles as easily as any other animal of her age. I merely give the facts of this particular case, which prove conclusively what can be done for a broken-winded horse by judicious feeding, if the disease itself may not be entirely cured."

HORTICULTURE.

Proposed Register of Fruit Trees.

Reference has been made before in the pages of this journal to the desirability of having reliable statistics, based on practical experience, showing what varieties of fruit trees are or not suited to the various fruit-growing districts of the Colony. Our limited experience has already plainly shown that it is impossible to accept the results obtained in other countries as a basis on which to work in South Africa. The Western Board of Horticulture has recently been devoting its attention to the matter, and deputed Mr. Cillie, one of its members, to visit the fruit-growing districts during the past season and collect particulars. Mr. Cillie's report, which is printed below, contains much food for reflection. Too little attention appears to have been paid by growers to the propagation of varieties already in the country, which have proved themselves to be suitable to soil and climate and have become thoroughly acclimatised. Recent importations have resulted in the addition of many valuable varieties to our list of fruits; but we fear that some growers who have planted varieties solely on the strength of their reputation elsewhere have in some instances involved themselves in heavy loss. Experience must, however, be bought, and in building up what is practically a new industry, a certain percentage of failures must be expected.

Consequent on Mr. Cillie's report, the Horticultural Board on the 26th April last passed the following resolution, viz.:—

> "That the attention of the Department of Agriculture be "drawn to Mr. Cillie's report and recommendations contained "therein, more particularly to the part emphasising the heavy "losses sustained by growers through purchasing and planting "varieties of fruit trees proved to be totally unsuitable to the "conditions of this country, and that the Board entirely endorses "the views set forth. Further, that the Department be requested "to assist the Board in every way, but, more particularly, by "making, in conjunction with the Board, a full investigation "so as to be able, in due time, to place before those intending to "further embark in fruit-growing such information as will "prevent them from incurring heavy loss; and that the Board "is of opinion that, unless the above suggested enquiry is "vigorously taken in hand, the fruit-growing industry will receive "a crushing blow."

As regards the desirability of compiling a handbook or register wing the success or failure of different varieties in different ts, we are entirely in accord, but the matter can only be carried

through with the hearty co-operation of the fruit growers; and, in the interests of the country and of themselves, we would take the opportunity of appealing for their assistance. A form (specimen of which is given below) has been printed and will be distributed among fruit growers, and we would ask them to kindly fill in the particulars indicated under the different heads. It is hoped later on to be able to arrange for the personal visit to the observers of an expert, to collect further details, which will be published in due course and will it is hoped prove of benefit to all concerned in the industry.

Mr. Cillie's Report.

To the Chairman of the Board of Horticulture.

In accordance with the resolution passed at the quarterly meeting of the Horticultural Board held in October 1900, and confirmed at the meeting held in December last, I was appointed to collect information and investigate during the fruit season the suitability and failures of the different varieties of fruits under cultivation and report on the same, with the view of drafting a register of fruits suitable for cultivation in those districts of the Western Province where fruit-growing at present is taken in hand as an industry. I commenced my work about the middle of December by visiting orchards where I knew that early fruits, mostly apricots, had been cultivated on a fairly large scale with handsome profits for years past; and as Wellington and the vicinity constitute at present one of the chief centres of apricot culture, my attention was mostly given to that part. When, however, I found that one of the varieties of early apricots cultivated in Wellington came originally from Stellenbosch, I paid a visit to that place to find out if possible the age, origin and profitableness of those trees, collecting at the same time all the information I could get about other varieties of fruits also.

I made a plan or programme of my work how to proceed with my visits to the several districts, taking them in succession as the fruit would ripen, writing at the same time to different fruit growers to collect information in their respective neighbourhoods as far as possible, forwarding a list of questions to be answered, with the kind request to return same to me, so that I might have some basis for comparing the different districts before visiting them. I received several invitations to come over and promises of help, but very few answers indeed.

What struck me at the beginning of my work was the great difference of opinion which exists among fruit growers as to the success or failure of the different varieties of new fruits introduced the last eight or ten years. There are several of the new kinds that are universally recommended or universally condemned. About the great bulk, however, there is a difference of opinion, and it will be only by very careful investigation that a register can be compiled

with any surety or value to intending planters. That such a list or register is badly needed does not require long investigation, in fact the greater number of fruit planters feel every season more and more the need of some reliable guide. Undoubtedly the planting of useless kinds and varieties unsuitable to the locality is a harder blow to the fruit industry than is generally imagined. Another point of great importance is the fact that the majority of old Cape varieties of fruit had to make room for newer importations, and in not a few cases for far inferior sorts in their respective lines. Of course one of the reasons, if not the sole reason, is that nearly all our Cape fruits are un-named or only known by local names, or by such names as "early" or "late yellow" or "red," etc. That we have some kinds of old Cape varieties which with care and proper cultivation will hold their own is beyond arguing; and I would recommend that the approved old Cape sorts be properly named by a commission of three, one appointed by the Minister of Agriculture, one appointed by the Horticultural Board, as representing the fruit growers, and one by the nurserymen. I would further recommend that the Board approach the Minister of Agriculture to appoint some competent person in time for next fruit season to work on the drawing up of a fruit register, we as fruit growers promising to give our best help to such person, as we are fully convinced that such a guide will be appreciated by intending fruit growers. I had some practical illustrations during my visits to orchards about the need of a reliable guide, as the nurseryman's catalogue is the leader now. I found, however, that the work to be done in that connection would be of such magnitude that it would be impossible to do the same satisfactorily unless one's whole time during the fruit season at least could be devoted to the work.

P. J. CILLIE, C.SON.

Wellington.

RETURN OF FRUIT TREES GROWING ON FARM.

SPECIMEN FORM. (Shewing how "Return of Fruit Trees" is to be filled in.)

Name of Farm and District.	Sort and Variety of Fruit.	If Grafted, upon what stock.	When Planted.	Site and Nature of Soil.	Whether Irrigated or not.	Growth.	Bearing Capacity.	Diseases and Insect Pests, if any.	Degree of Virulence. 1. 2. 3. 4.	Whether Recommended or not. (Giving Reasons if not Recommended.)
"RHONE." Stellenbosch.	PEACH. Early Rivers	Grafted on Wild Peach.	2 Aug., '98	Level, Clay and Granite mixed.	Not.	Indifferent	Uncertain Croppers.	Peach Scab.	1.	Not. Bad Carrier.
do.	Crawford's Late.	Grafted on Plum Stock.	do.	Steep Slope to S.E. Sandy	Yes.	Good.	Fair.	Peach Curl	3.	Not. Bad Cropper.

Board of Horticulture Meeting, Western Province.

The quarterly meeting of the Western Province Board of Horticulture was held in the office of the Agricultural Department on Friday, 7th June, there being present:—Messrs. C. W. H. Köhler (in the chair), H. Cloete, H. Meyers, C. P. Lounsbury (Government Entomologist), P. R. Malleson, W. van der Byl, P. J. le Roux, P. J. Cillie, C. son, J. P. Roux, Rev. S. J. du Toit, D. de Vos Rabie, M.L.A., and A. A. Persse (Secretary).

A discussion took place with regard to the validity of the special meeting at Stellenbosch; and it was held that as there was no quorum at the meeting in question, and as the regulations provide that all meetings shall be held in Cape Town, the meeting was invalid and the resolutions passed thereat null and void.

It was pointed out by the Chairman that there was no quorum at the last quarterly meeting. It was therefore moved as a special motion by Mr. Cloete, secended by Mr. Malleson, and agreed to: "That the minutes of this meeting be confirmed."

Election of Board.—Mr. Malleson pointed out that owing to the existence of Martial Law in many districts, it would be difficult to carry out the regulations with regard to the election of new members, and he proposed therefore that the Secretary communicate with the various Associations, pointing out that the time of membership has expired, so that if they wish to elect new members and find it practicable they can do so; and that meantime the consent of the Secretary for Agriculture be sought to the Board being allowed to carry on until such time as elections can be held.

Mr. Cillie moved as an amendment that the ordinary course be adopted.

On putting the matter to the vote, the amendment was negatived and the original motion carried.

Wine Show.—In connection with a letter from the Agricultural Department, intimating that in future the Government contribution towards Wine Shows would be limited to $\frac{5}{8}$ths of the prize money awarded, the following resolution was moved by Mr. Cloete, and carried:—"That in view of the fact that there are no revenues attached to Wine Shows, such as gate money, etc., and many of the Associations have no interest in vine-culture, and therefore would not contribute, wine shows cannot possibly be put on the same footing as other shows. Unless the Government are prepared to make other proposals than they make at present, wine shows, so highly desirable in the interests of vine-culture, must necessarily cease. The Board, to prevent so disastrous a result happening, requests the Government to reconsider this matter, and to lay before the next session of Parliament a measure providing for a special grant for the purpose of continuing the shows."

The idea of holding a show during this season was, by general consent, abandoned.

Export of Fruit Pulp.—Letter was read from the Agricultural Department, forwarding the following reports received by the Agent-General on the subject of the demand for and price of fruit pulp.

It was resolved, on the motion of Mr. Malleson, that the matter stand over till next meeting, and that meantime the reports be published in the *Agricultural Journal*.

Copy. 112, Victoria Street,
London, S.W.

EXPORT OF PULPED FRUIT.

Sir,

In compliance with the request contained in your letter No. B/504/80 of the 22nd ultimo, I made enquiries from the leading firms of jam and preserve manufacturers in this country and have received the following replies :—

Crosse & Blackwell, Ltd.—The only fruit pulp that has a large sale in this country is apricot, and that only of the finest qualities which comes from France, Spain, California and Australia. The present value is from 13s. to 16s. per cwt. delivered in London.

Sidney Ord & Co.—With the exception of apricot, which is pulped on the Continent, all our jams are made from English-grown fruit, and we regret consequently we are unable to give you the information you desire. Apricot pulp is usually packed in cases containing ten 5-kilo tins,* and the price according to quality averages 14s. to 21s. per case. The pulp should be entirely free from chemical preservative and added water.

Liptons, Ltd.—We should like to have some information as to what kinds of fruit pulp it is intended to ship. The only kind of fruit pulp that would interest us is apricot; there is always a steady demand for apricot pulp, both Continental and Colonial. There is also from time to time a considerable quantity of Colonial raspberry pulp on the market; we ourselves up to the present have not had much experience of it. No doubt if a reliable article could be guaranteed it would readily find a place on the market. The present value of apricot pulp would be about 16s. per cwt.; the crops in France and Spain were particularly heavy, and this fruit in consequence is very cheap this season.

Jas. Keiller & Son, Ltd.—The bulk of our jams is made from English fresh fruit, and it would depend entirely on the quality of the pulp imported whether it would be suitable for our purpose. If you care to let us see samples, we will be very pleased to test them, and could then report further as to their suitability.

Rowlett & Gooding.—We think that there would be a very good outlet for Colonial pulped fruits in this country, such as apricot pulp, raspberry pulp, etc. Prices would depend upon the quality and on supply and demand, and shipments would have to be made in tins, not in casks.

* Say 11lb. avoirdupois.—ED.

E. & T. Pink.—With the exception of apricots, which are preserved in France and Spain and come to us in cases containing 10 lb. tins (net weight of fruit), costing us at the present moment 15s. per case ex wharf London, the whole of the fruit we use for the manufacture of preserves is fresh fruit. Our experience is that fruit grown in hotter or climates differing from England will not answer the purpose that English fruit will for jam-making.

Clarke, Nickolls & Coombs, Ltd.—Hitherto we have confined ourselves, with the exception of apricots, almost entirely to English-grown fruits, and can hardly suppose that the small fruits, such as raspberry, strawberry, etc., could be shipped here from the Cape at a profit in normal seasons. Apricots we buy out of the country, as these are not of course otherwise obtainable, and as you refer to the question of price we may say that the market price for tinned apricots depends entirely upon the supplies which come in from South of France and Spain, flooding our markets at times with heavy shipments. As showing present values we have before us an offer of fine Spanish apricot pulp at 14s. 3d. per case of ten 5-kilogramme tins. Possibly the Cape gooseberry, which we understand is something of a speciality, might be introduced in this way to preserve makers here, if freight and packing charges would admit of its being put down at a favourable price in London.

H. Antrau.—I have large outlets for all kinds of fruit pulps and would be pleased to sell any that you could put in my hands. With regard to price, it is impossible to fix this without first seeing fair-sized samples.

I am informed that the Union-Castle S.S. Co. quote a special low rate of freight for fruit pulp, viz. :—25s. per ton of 40 cubic feet from Cape Town to London.

I am, Sir,
Your obedient servant,
(Sgd.) D. TENNANT.

The Honourable,
The Secretary for Agriculture,
Cape Town.

Failure of Citrus Trees.—Letters on this subject were read from the Agricultural Department and from Mr. Meyers. After discussion, it was agreed that a commission of two be appointed to enquire into the matter, and that the Government appoint one member and the Board the other. Messrs. P. J. Cillie and H. E. V. Pickstone were nominated as the Board's representative, and a ballot being taken, Mr. Cillie was declared duly elected.

Importation of Netting.—It was resolved, on the motion of Mr. du Toit, that the Board place £50 at Mr. Lounsbury's disposal for the purpose of importing a supply of bird and fly netting for distribution.

Crude Petroleum as an Insecticide.—Letter was read from the Constantia Fruit Growers' Association drawing attention to the fact that crude petroleum was being used with great success in California

as a tree wash against scale insects, and asking the Board to investigate the matter.

The Secretary read the following memorandum prepared by the Government Entomologist, which it was decided to have published for the information of fruit growers:—

"The utility of crude petroleum for insecticidal purposes, particularly for the destruction of scale insects, has been the subject of occasional comment in the agricultural press of the United States and some of the English colonies for five years or more. Its actual use as an insecticide has been very limited, for in the hands of many parties it has proved highly unsatisfactory, in some cases resulting in the destruction of all the vegetation to which it was applied. In other cases, great satisfaction with it has been expressed, both as regards its efficacy as an insecticide and its harmlessness to the plants. For several years no reasonable explanation to account for the variance of the results was offered by anyone, but now it is becoming accepted that the difference is due to differences in the oils used; in other words, the term "crude petroleum" covers a wide variety of crude mineral oils of variable value as insecticides. Professor J. B. Smith of the New Jersey State Experiment Station has, perhaps, been the most active of the many entomologists who have become interested in the use of crude oil against scale insects. As the results of his numerous experiments and observations on the action of crude oils in the hands of fruit growers who have been putting his experimental findings to the test, he recently announced (Bulletin 146, dated November 1st, 1900) that "crude petroleum of proper quality, properly used, forms a reasonably safe, economical and effective material for the purpose" of destroying the San José Scale. He cautions, however, that his conclusions should not be relied on in climates unlike that of his State. By "proper quality" he refers to oils not manipulated in any way which register 42° or above on the Beaume oil scale, such having a paraffine and not an asphaltum base. It appears that many crude oils register less than 42°, some even less than 35°, and all of these are considered dangerous for spraying purposes. By "proper use" he means that the spraying must not be excessive, since if too much oil is used a deposit is left on the bark which may cause severe injury. Cut surfaces, he mentions, usually allow enough oil to enter to kill the wood for an inch back. The use of the oil on trees in foliage is not recommended.

During the last few years crude oil has been recommended as an insecticide for scale insects in California. As far as I have been able to learn, however, the oil is never used in its crude condition, that is, as it comes from the wells and as the oils are used in the eastern United States. The Californian crude oils have an asphaltum, not a paraffine, base and are therefore not directly comparable with the oils used in the east. The asphaltum is removed from the oil that is sold for insecticidal purposes and the resulting product emulsified with soap. For spraying orange trees the

emulsion is diluted with eleven parts of water; a stronger spraying mixture than this, or one in which the oil is not properly emulsified, is said to injure the trees. As in the east, some trouble has been experienced from the variable quality of the oil, some lots killing the scale far better than others. Altogether, what is called "crude oil" spraying in California is spraying with an emulsion of oil, soap and water, comparable with our paraffine emulsion spray in all respects than that an unrefined oil is used in place of a refined. The Californians claim somewhat better results than with ordinary paraffine emulsion, but the chief advantage is that of the relative inexpensiveness of the unrefined oil. There are numerous oil wells in Southern California, and I was told that oil just as it comes from the ground can often be bought in Los Angeles at less than a penny a gallon in barrel lots. The manipulated oil ready for emulsifying sells at about 2½d. per gallon. It must not be understood that crude oil spraying has supplanted the older insecticides entirely; enormous quantities of resin wash and greater quantities of lime-salt-sulphur mixture are still used, and in some districts to the exclusion of the newer oil spray.

It would be impracticable on the score of expense for us to import Californian crude oil into this Colony. We can get the eastern crude oils, and doubtless, if we insisted on it, could get the grade recommended by Professor Smith. The price fluctuates, but is about 5d. per imperial gallon in Philadelphia in barrel lots. In 1896, I considered the advisability of importing crude oil for use by our fruit growers and decided then that it would not pay. I had enquiries made, and found that the oil would cost at least 25s. a barrel, or 5s. per case of eight gallons, insurance included in either case, brought to Table Bay. Dock charges and duty would swell the cost greatly, and before we could have it sent about in the country we would have to get the Railway to amend its regulations. Now the acceptance of crude petroleum for carriage is prohibited."

CHAS. P. LOUNSBURY,
Government Entomologist.

Return of Imports.—Returns showing the quantities of fruits, tubers, plants, &c., imported at the different ports of the Colony during the month of March, April and May, were laid before the meeting. The following is a summary:—

MARCH.

	Fruit.	Potatoes.	Trees.	Plants.	Bulbs.
Cape Town ...	580 cases	2 pkges.		5 cases	5 cases
Port Elizabeth ...	4 ,,	266 ,,	9 cases		1 ,,
Mossel Bay ..		24 ,,	1 ,,		

APRIL.

	Fruit.	Potatoes.	Onions.	Plants.	Bulbs.
Cape Town ...	801 pkges.	3,438 pkges.		11 pkges.	1 pkge.
Port Elizabeth ...	1 ,,	683 ,,	37 pkges.	1 ,,	1 ,,

MAY.

	Fruit.	Potatoes.	Trees.	Plants.
Cape Town ..	2,028 pkges.	550 pkges.	1 case	6 cases
East London ..	15 ,,			

Removal of Fruit Trees into Worcester Division.—Mr. Malleson brought to the notice of the Board that an embargo had been placed on the removal of fruit trees from infected areas into the Worcester Division. Formerly trees could be brought in without let or hindrance, but now that phylloxera had appeared in the Worcester district, this regulation had been brought in. He saw no reason why fruit trees should not be allowed in, provided they had been properly disinfected under Government supervision. The fallacy of the matter was that trees were allowed to be brought in from Constantia, which was really an infected area, although not proclaimed as such.

Mr. Rabie said that the regulation was passed to protect the vineyards, which were of far more importance in the Worcester Division than the orchards. If Constantia was an infected area, it was not fair that trees should be allowed in from that part, but it should be closed as well.

After discussion, it was resolved that a deputation consisting of Messrs. Rabie, Meyers and Lounsbury wait upon the Secretary for Agriculture to represent the matter to him.

Importation of Peach Stocks.—Extract was read from the *Fruit World* reporting that a large consignment of peach stocks was being sent from Georgia to the Cape and Natal. The Secretary was instructed to bring the matter to the notice of the Natal authorities, and to say that if the stocks arrived here, they would, under existing regulations, be destroyed, Georgia being a peach-rosette infected State.

Chairmanship.—Mr. Van der Byl proposed, seconded by Mr. Cloete, and it was carried, that Mr. Köhler act as Chairman until such time as a new Board be appointed.

Mr. Cillie's Report.—In connection with Mr. Cillie's report (which has recently been published in this journal) that gentleman put in a list of varieties of fruit trees in regard to which he had gathered sufficient evidence either to recommend or condemn. After considerable discussion, the following resolution was carried : "That the attention of the Department of Agriculture be drawn to Mr. Cillie's report and recommendations, more particularly to the part emphasising the heavy losses sustained by growers through purchasing and planting varieties of fruit trees proved to be totally unsuited to the conditions of the district visited by him. Further, that the Department of Agriculture be requested to assist the Board in every way, but more particularly by making full investigation, in conjunction with the Board and the various Associations, by means of properly qualified persons in each district, so as to be able in due time to place before those intending to further embark in fruit growing such information as will prevent them from incurring heavy loss."

Scale on Exported Fruit.—The Secretary read extract from the *California Fruit Grower*, in which it was stated that some of the fruit exported from the Cape during the past season was infested with scale.

The meeting then adjourned, after passing a vote of thanks to the Chairman.

Underground Cool Stores for Fruit.

"There is a great future before cold storage (says the *Field*) for fruit and other edible products, and there are many simple ways in which it may be cheaply and efficiently, and we may add profitably, carried out in the garden. Cold, or cool storage, is no new thing, and in the old days of home-brewed beer and home-grown food products of all kinds the cellar often, even if not always, formed the best of places in which food and beverages of all kinds could be preserved. In these days the old-fashioned cellars, partly or wholly below the ground level, are often left out of the specifications of modern houses, and a poor substitute for it, called a larder, is generally next door to the kitchen and above ground level. This makeshift acts very well so far as daily supplies from the shops are concerned, but it is useless for the preservation of bulky produce that is often the better, more useful, and valuable in proportion to the length of time for which it may be preserved. To this class of home-grown produce belong apples, pears, and, of course, onions and potatoes, &c. The first and last named of these may be, and sometimes are, preserved fairly well by "pitting" or burying them in the ground behind a north wall or evergreen hedge, covering them with clean straw or brake fern, and finally with a thick layer of soil, which is roughly thatched or covered with loose litter to exclude frost and rain. This is, after all, an expedient better suited to farm than to garden produce, and for the longest keeping of apples and pears there is nothing better than a low, cool cellar or a thick-walled fruit room, heavily thatched overhead with heather or reeds, and for the most part underground. In nearly all old country and farmhouses the entire basement consists of stone-walled rooms or cellars, always cool in summer, and never very warm even in the hot days of summer and autumn. The temperature of such places does not vary from the mean more than 5° or 6° throughout the year, and both light and ventilation are under absolute control. Apart from an equable temperature, however, there is an equable amount of moisture in the air, and this prevents the shrivelling of ripe or ripening fruit that so often occurs in ordinary fruit rooms.

Where there are cellars in the naturally moist sandstone rock as at Nottingham, Chester, and elsewhere, such hardy fruits as apples may be preserved fresh and well flavoured until the next season's

crop is fit to use, and this in country places is a result much to be desired. Years ago the entrance passages to old-fashioned ice-wells were now and then utilised for hardy fruit preservation, as well as for retarding the vegetative growth of bulbs, seeds, fruit trees in pots, &c. Lily of the valley roots and lilac bushes in pots or tubs may be had in bloom nearly all the year if retarded or kept back in dark and cold atmospheres. A new method of preserving fruit in a fresh and unchanged condition is now being introduced from America, particulars of which will be afforded to those interested by the Lawton Patents Company Limited, of 57A, Hatton-garden. This system depends mainly for its success on the deoxidising and sterilising of the atmosphere of air-tight chambers, lined with efficient non-conducting materials, so that an equable temperature is retained, while surplus moisture is likewise removed, and, according to a recent account in the *Times*, good results with grapes, bananas and tomatoes have been secured.

While in America it has been found that ordinary ice chambers, or refrigerating cars, have acted fairly well for the preservation during transit of both fresh fish and tender fruit, the expense and extra labour involved have been a drawback to their general employment, especially under local conditions and on a small scale. The ice well is in many remote country places still in existence, and might be utilised more often than it is in hardy fruit preservation. Mr. W. Crump, of the gardens, Madresfield Court, has solved the problem, so far as apples are concerned, by an excavated lower chamber, or cellar, under the fruit room, where an equable temperature of 40 to 50 degrees can be easily maintained, surplus moisture being eliminated by judicious ventilation. The floor of the cellar may be kept wet, but the fruit itself is best free from evident moisture.

It seems very probable that the utilisation of condensed or liquefied air may supersede even our latest practical attempts at continuous low temperatures, and we hope that Professor Dewar may be induced to turn his attention to this phase of a great economic subject, viz., the distribution and preservation of all our best food products, whether of foreign or home growth.

After much practical experience Mr. Crump believes that co-operative fruit-growing, and plenty of cool storage facilities, would revolutionise our home-grown hard fruits if applied in a sound commercial manner. Some of the best of late keeping apples are the following: Bramley's Seedling, Tower of Glamis, Wellington (Normanton Wonder), Norfolk Beaufin, Striped Beaufin, Lane's Prince Albert, Bismarck, Newton Wonder, Winter Queening, Northern Greening, and others more locally known and grown.

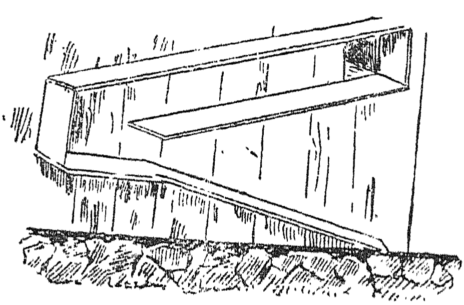
Dessert kinds are more limited, but Cox's Orange Pippin is a host in itself as well grown. Blenheim Orange is also a fine kind, either for table or kitchen use. Mr. Geo. Bunyard, of Maidstone, who is one of our best practical experts on hardy fruit growing and fruit keeping, advises the organisation of a system of cool storage for the

best of our longest keeping apples, and this much is necessary if we are to get a share of the best prices that good apples fetch in the market from Christmas until August, when the new season's supply begins. This subject has received attention for many years in the *Field*, and it is pleasant to see that recommendations therein made are now becoming of vital interest to our home growers and to consumers of late apples and of other home-grown produce."

Though the above paper refers primarily to fruit keeping in England, there are hints and experiences useful to ourselves. For, in this country, the fresh fruit season is exceedingly short. Apples, for instance, keep but a few weeks, or we may say a few days, if ripe and exposed to ordinary temperature and conditions. With the increased cultivation of fruit, plans for its effective preservation will be most desirable.—EDITOR.

MISCELLANEOUS.

Roosting for Fowls.



WAY TO THE ROOSTING PLACE.

The above illustration from the *Rural World* is intended to show by an ingenious arrangement how hens may be enabled to roost in an upper story, so that a building made a little higher than usual may be made to house two lots of hens instead of one. The boards may be fixed to the outside of the house by angle irons firmly screwed. The roadway is shown in relief, but when constructed it should be entirely covered in, so that the passage, while narrow, is made real and at the same time cosy. The birds will soon pass upwards, for the incline is very slight, and find their way to the home, which, with roosts and nest-boxes, has been prepared for them."

This arrangement not only tends to the comfort of the fowls but it must also conduce to their safety as a protection from the attacks of predatory animals and thieves.—EDITOR.

Shrinkage in Weight of Mealies.

That mealies stored either in the cob or in grain decrease in weight if kept in a dry store is pretty well understood. In the following report in the *Van Wert* (Ohio) *Bulletin* we have some interesting particulars of the results of a test trial, giving time stored and loss of weight:—

"An interesting test, showing the shrinkage of corn in the ear, made by one of the most methodical farmers in Van Wert county, is given to the *Bulletin* by the T. S. Gilliland Grain Company. Last fall A. A. Giffin of Hoaglin township weighed one crib of corn when he put it up. The first load was cribbed Oct. 9 and the last Oct. 22. The total amount of corn cribbed was 34,970 pounds. The first load was hauled out January 8 and the last Feb. 1. The total hauled out was 29,995 pounds, showing a shrinkage of 4,995 pounds, or 14 per cent. This is new light on the shrinkage of good corn in prime condition. The popular rule for estimating shrinkage has heretofore placed the loss by this process at 7 to 8 per cent. for all grades of corn. Mr. Giffin's painstaking is therefore a valuable lesson to his fellow farmers."

How to Make Candied Peel.

To make candied peel choose sound, fresh lemons or citrons, and cut them into quarters lengthwise. Remove all the pulp, and soak the rind in salt water for three days, and afterwards in cold water for a day. Next boil it in fresh water until it becomes tender; then drain the rind, and cover it with syrup made with 1lb. of sugar to a quart of water. The rind will begin to look clear in about 30min., when it must be again drained. Now make a thick syrup, allowing 1lb. of sugar to a pint of water. Boil the rind in this over a slow fire until the syrup candies. Then take out the rind, drain it, and dry in a cool oven.—*Town and Country Journal.*

Estimating *versus* Weighing Milk Yields.

In the bulletin of the United States Department of Agriculture on "The Dairy Herd," occurs the following:—

"A dairyman of wide reputation, president of a state association for years, concluded to adopt the daily milk record rather because of those who advocated it than of any conviction of needing it himself. His herd was of his own breeding, he had handled every cow from its birth, and he and his sons did the milking. Before beginning the record he made note—for the joint opinion of himself and sons—as to the half-dozen best cows in the herd, and an estimate of their season's milk yield. When the year's record was completed it was found that in order of actual merit the cows stood

as follows:—The best cow was the fifth estimate; the second, a cow not on the list; the third was the fourth on the list; the fourth was the first; the fifth was his sixth, a cow not in the estimate; and his second and third in previous estimate were way down on the list. These facts were borne out by subsequent records, and the man, who had called himself a dairyman, was forced to the conclusion that one-fourth of his cows were being kept at an actual loss, while the others barely paid their way."

Use and Care of Farm Machinery.

A correspondent of the *Australian Farm* calls the attention of his brother farmers to this important subject with the following useful suggestions:—

"We cannot afford to long use a machine the construction or adjustment of which is such that it does not do its work easily and in the best manner. Skilful manipulation, straight driving and good work add to our reputation and that of the machines we use, besides being an incentive to ourselves and others to do our best in all we undertake.

It is poor economy to do without any implement or machine that can be profitably used and cared for. The best, such as are advertised in the best farm papers, are the cheapest. An inferior or second-hand tool is usually dear even at a low price.

Every farmer boy should strive to become an "expert" to the extent that he can properly set up, adjust, and operate all farm machines. When something, you know not what, interferes with perfect work do not become excited and make more misadjustments, but study your machine; understand the functions of its parts and if possible locate and remedy the difficulty.

Before making an uncertain adjustment it is well to mark the exact position of the parts. Watch the bolts. If a nut persists in working off, try putting a washer under it.

Plainly printed on one of the first successful reapers and binders ever made was this good advice: "Keep your knives sharp and the journals well oiled." The frequent use of a good grindstone is economy, and of good oil a necessity. Little and often should be the rule, and see that it reaches the bearing. Never leave a tool without removing the soil from polished surfaces, and if any indication of rain, rub on a little oil. If to stand long exposed, use axle grease, but, under a roof, lard is as good and easier removed. It is much easier and better to prevent rust than to remove it.

Never bring home a new machine until a shelter is provided for it, whether it be a straw shed or the elaborate machine house; by all means have something. Sun and rain destroy more machinery than does its proper use. Have a door in shed wide enough to admit easy passage of the largest machine, and make it a rule that no team shall be unhitched from any machine when its season's work is done, excepting in front of this door."

CORRESPONDENCE.

Pyrethrum or Persian Insect Powder Plant.

In the *Journal* of May 9th last I notice a short note on Pyrethrum. A few years ago Professor MacOwan kindly sent me some seeds of the plant from which I managed to raise five plants. By breaking these up into very small pieces I was able to supply a number of my friends with plants, so that they have now for some years been able to grow their own insect powder and keep their dwellings clear of flies. We use a small coffee mill for grinding the powder; but it does not grind sufficiently fine. I would be very glad to hear from any of your correspondents what kind of mill they use. The powder is very strong and frequently kills flies the second day after being used. Pyrethrum grows readily from the smallest piece, the same as chrysanthemums, so that one bush of a year's growth will give a large number of plants the second year. Every farmer in the country could grow his own pyrethrum, for the plant will grow in almost any soil, even in "brak" soil.

J. P Cloete.

Alexandersfontein, Darling, June 6th.

It will be seen from a notice of Pyrethrum in No. 6 of this volume, that a correspondent wrote the *dried* flowers were ground in a coffee mill. Possibly, with some adjustment in setting, a coffee mill is at present the most handy for the purpose. We shall, however, be much pleased to hear from any of our readers who have found any other method of preparing this grand insecticide for economical and effective use.—Editor.

Watermelons not Setting their Fruit.

I should like to know what to use in the ground for watermelons. They bear a few and very small.

John Hiti.

Jerusalem, April 25th.

(*a*). In the rapidly growing plants of the melon and cucumber sort there are two principal causes which may hinder fruiting. The one is the stimulation of the vegetative system of the plant so greatly as to produce an immense growth of stems and leafage and little or no flowers for reproduction. This is the frequent result of over-manuring with raw stable manure not properly rotted down, or with a too liberal top-dressing of guano, which last treatment is very rarely required save in very poor and recently reclaimed soil. The plant runs to leaf and stem. So, it may be remembered, animals over-fed and pampered do not readily take the male and become pregnant.

The remedy is obviously to thin out the surplus stems near the crown, and pinch back those that are left to a length of 4 or 5 feet. But this must be done early, and, in fact, the stopping of the natural luxuriance of the plant by pinching out the growing ends of the running stems should always be done.

(*b*). The other cause is a want of mutual fertilizing among the flowers. This may happen to plants which show a good deal of bloom, as will be seen presently. Note that all these plants have in general their male organs, which produce the fertilizing dust or pollen, in one flower,—their female organ which ultimately becomes the fruit, (melon, cucumber, pumpkin, etc.) in another flower. The bees or other insects go into the male flower in search of honey, and come out dusted over with the fertilizing pollen. They then, as it chances, pass on to a female flower, and unconsciously rub off some of the pollen upon the tip of the female organ. This is all that is wanted to ensure the "setting," as it is called, of the fruit. The stimulus of the pollen sets the female ovary growing in a way impossible to it if not pollinated, and it ultimately becomes the wished-for fruit full of fertile seeds. Clearly, as with animals so with plants, the act of generation implies the union of the two differing sexes.

If, by chance, insects do not perform this function of carrying over the pollen, the female flower withers away, producing nothing. The gardener must therefore do the work of the insect. He must carefully pick out the male flowers and lay one over each female. By this means the pollen drops on to the ovarian organ and fertilizes it. Or, better still, a camel-hair brush the size of a small pencil may be rubbed gently with the male flower till it is dusted over with the yellow pollen, and then it is to be touched into the centre of the females. Impregnation and fertility follows. When choice melons, etc., are grown, as in England, *under glass*, and insects thereby kept at bay, this artificial method is always adopted, and with perfect success.

Also it is worthy of note that many such plants are apt to produce male flowers at the extreme ends of their over-long branches, and the females a little later and nearer to the crown. If therefore long shoots are permitted to extend as they like, it follows that there is a majority of males, *i.e.*, barren of fruit,—and very few female fruit-producing flowers. This is another reason for the practice of shortening back the over-luxuriant shoots.

P. MacOwan.

May 20th, 1901.

Rape Feed and Oil Cake.

Will you kindly give me some information on the following. Can rape be fed to stock with advantage in its natural state, *i.e.*, without being manufactured into cake? Is it a wholesome food? If grazed off by stock, would the ploughing in of any that remained, and the roots or stubble, in any way benefit the soil? Is it a legume in the sense that clovers are? What quantity should be sowed to the acre?

C. W. Tomes.

Middlepost, Hoetjes Bay, June 15th.

Rape seed is sown at the rate of 4 to 5lb. per acre if sown broadcast, and 3 lb. if drilled in, which is the better plan. The drills are made about eighteen inches apart. It will be ready for feeding sheep in about two months from the time the seed is sown.

The way to make the best of the crop is to cut it and feed the sheep on the veld, as sheep put on a growing crop destroy a good deal of it by treading. It is also safer for the sheep, as if they are hungry and eat ravenously they will get blown or hoven. However, with good management there is little danger and they should stay but a short time. When cut and fed on the veld, it can be distributed and its consumption controlled, besides which it is a most wholesome and nutritious feed. It is a cruciferous plant, like the radish, and its cultivation benefits the land.

Rape seed is crushed for oil, and the best kinds of cake are good feed for sheep and other stock.—Editor.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the article on "Rust-resistent Seed Oats" published in the issue of this journal under date February 14th (No. 4, vol. xviii., pages 189-191) it is notified for the information of farmers and others interested that a limited quantity of *River Plate Oats* and *Texas Rust-resistent Seed Oats* have been procured by the Government for experimental sowing during the coming season, and are now available for distribution at cost price, in lots not exceeding 3 bags of each to any one applicant.

The price of the seed delivered at Cape Town Station is as follows :—River Plate Oats—17s. 6d. per bag of 150 lb. Texas Seed Oats—19s. per bag of 150 lb.

Applications addressed to the Under-Secretary for Agriculture, Cape Town.

Surplus Seedlings.

It is hereby notified, for general information, that the following surplus seedlings can be obtained at the rate of 6s. per 1,000, from the Government Nurseries mentioned below, viz. :—

At Tokai Nursery.	
Eucalyptus crebra (Crebra)	4,000
Eucalyptus botryoides (Botryoides)	3,500
Eucalyptus longifolia (Longifolia)	5,000
Gonioma kamassi (Kamassi)	500
Syncarpia laurifolia (Syncarpia)	400
Tristania conferta (Tristania)	400
At Uitvlugt Nursery.	
Eucalyptus leucoxylon (Leucoxylon)	10,000
Eucalyptus rostrata (Rostrata-Jarrah)	7,000
At Kluitjes Kraal Nursery.	
Hakea suaveolens (Common Hakea)	10,000
Cupressus lusitanica (Portuguese Cypress)	1,000
Callitris calcarata (Cypress Pine)	5,000
Melaleuca Leucadendron (Broad Leaved Paper Bark)	1,000
Pinus mitis	5,000

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October last:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent..............................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..

(Address)..

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent..............................

(Inspector's signature)..

(Address)..

Date...................

Farm Apprentices, Labourers, etc.

In connection with the Notice under the heading "Farming Apprentices or Learners," published in the *Agricultural Journal* of the 25th May, 1899 (No. 11, Vol. XIV.) and in earlier Numbers, the Department desires to make it known that there are a number of men now in the country, and many others will doubtless arrive, who have had a wide and varied experience of farming in England, Canada, Australia and elsewhere, and are desirous of obtaining employment as stock managers, foremen, farm hands or in other capacities. Many of them possess a knowledge of blacksmith's work, carpentering, bricklaying, and other trades which would doubtless prove of value in farm life. As the necessity for a more skilled class of labour in many branches of farming is beginning to be keenly felt, it is thought that farmers may like to take advantage of the opportunity of securing the services of some of these men. If therefore they will communicate with the Agricultural Department, giving a list of their requirements, steps will be taken to put them into communication with suitable persons.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Introduction of Horned Cattle from Basutoland.

By command of His Excellency the Governor, the following Proclamation No. 100, 1901, was published in the *Government Gazette* of June 7th last:—

Under and by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest has appeared amongst cattle in Basutoland, the introduction of *horned cattle* from Basutoland into this Colony shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Feeding Stuffs and Manures.

ENGLISH PRICES per ton of 2,240 lb.

		£ s. d.		£ s. d.
Bran		5 2 6	to	5 12 0
English linseed cake	ex mill	7 12 6	,,	7 15 0
American Western linseed cake	ex quay	6 15 0	,,	7 0 0
Russian oil cake	,,	6 15 0	,,	7 5 0
Decorticated cotton cake	,,	6 5 0	,,	6 10 0
Decorticated cotton meal	,,	6 2 6	,,	—
London made cotton cake (best)	ex mill	4 15 0	,,	—
Egyptian cotton cake (in bags)	ex quay	4 8 9	,,	4 10 0
Burton desiccated ale grains (bags included)	on rail, Burton	4 7 6	,,	—
Rangoon rice meal	ex warehouse	4 2 6	,,	—
Russian linseed in bulk, per 416lb.	,,	2 10 0	,,	2 15 0
Calcutta linseed in bags, per 416lb.	,,	2 14 0	,,	—
Locust Beans	,,	5 2 6	,,	5 12 0
MANURES—				
Nitrate of soda		8 15 0	,,	8 17 6
Bone meal		4 5 0	,,	4 10 0
Kainit..		2 7 6	,,	2 10 0
Basic slag, 35 to 40 per cent. ..	nominal	—		—
Superphosphate, 25 per cent. soluble phosphate ..		2 5 0	,,	2 7 6
,, guaranteed 35 per cent. soluble .. phosphate		3 2 6	,,	3 5 0

Mark Lane Express, May 27th, 1901.

AMERICAN PRICES per ton of 2,000 lb.

	£ s. d.		£ s. d.
Bran, per ton	3 15 0	to	4 5 0
Linseed cake	5 10 0	,,	5 12 6
Cottonseed cake meal, 60 lb...	5 4 6	,,	—
Mealies, per bushel 60 lb.	0 2 0	,,	0 2 1
Barley, per bushel 50 lb.	0 2 1	,,	0 2 3
Clover seed, per lb.	0 0 6	,,	—
MANURES—			
Ground Bones	3 17 0	,,	4 12 0
Kainit	1 18 9	,,	2 0 0
Florida Rock Phosphate	1 18 0	,,	2 10 0
Nitrate of Soda, per 100 lb.	0 7 9	,,	0 8 0
Sulphate of Ammonia, per 100 lb.	0 11 9	,,	0 12 0
Muriate of Potash, per 100 lb.	0 7 9	,,	0 8 0

New York Weekly Journal of Commerce, May 13th, 1901.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 854.

The third of the series for the year 1901 began on April 30th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus: Double triangle, crossed arrows, &c.

Mark.	Description & Ship.	Bales.	s.	d.
CAPE.		May 6		
Raglan.				
HM/Caledon	Grs.com ...	7	0	6¾
	,, lks. ..	1	0	3½
(V)	,, com. ..	12	0	6¼
	,, lks. ...	1	0	3¼
IN/Caledon/A	... ,, com. ...	7	0	6¾
,, ,, B	.. ,, ,, ..	15	0	7
,, ,, C	.. ,, ,, ..	9	0	7
,, ,, G	,, ,, ..	5	0	6½
	,, ,, ..	4	0	6¼
,, ,, H	.. ,, ,, ...	7	0	6¾
,, ,, L	.. ,, ,, ...	17	0	6¾
,, ,, N	.. ,, ,, ..	10	0	7
,, ,, R	.. ,, ,, ...	5	0	7¼
,, ,, T	.. ,, ,, ..	13	0	6½
,, ,, U	.. ,, ,, ..	4	0	6½
,, ,, V	.. ,, ,, ..	6	0	7
,, ,, W	.. ,, ,, ..	2	0	6½
,, ,, X	.. ,, ,, ..	54	0	6½
,, ,, Y	.. ,, ,, ..	8	0	6¼
,, ,, Z	.. ,, ,, ..	9	0	6¼
,, ,,	.. ,, lks. ..	5	0	3¾
,, ,, E	..Flc.wsh.com. ..	4	0	9½
,, ,, D	.. ,, ,, ,, ..	2	0	9½
IN/Caledon/F	..Flc.wsh.com. ..	13	0	10
,, ,, I	.. ,, ,, ,, ..	2	0	10
,, ,, J	.. ,, ,, ,, ..	3	0	9½
,, ,, P	.. ,, ,, ,, ..	4	0	10
,, ,, M	.. ,, ,, ,, ..	3	0	10
,, ,, K	.. ,, ,, ,, ..	4	0	9¼
,, ,, O	.. ,, ,, ,, ..	6	0	10
,, ,, Q	.. ,, ,, ,, ..	4	0	9½
,, ,, S	.. ,, ,, ,, ..	6	0	10
,, ,,	.. ,, ,, lks. ..	1	0	5¾
AN/G	Grs.com. ..	20	0	6¾
	,, ,, ..	21	0	6¾
	,, ,, ..	17	0	6¾
,, CD	..Flc.wsh.com. ..	7	0	10
,, W	.. ,, ,, ,, ..	3	0	9
Norham.				
AN G	Grs.com.	12or13	0	6½
	,, lam. ..	2	0	6¾
	,, lks. ..	2	0	3
	mix. ..	1	0	3¼
IN/Caledon	Grs.lam. ..	11	0	6½
	Flc.wsh.lam ...	5	0	7¼
,, ,, AA	.. ,, ,, com ...	14	0	9½
,, ,, BB	.. ,, ,, ,, ..	6	0	8½
,, ,,	.. ,, ,, lks. ..	1	0	5½

Carisbrook, Tintagel.

Mark.	Description & Ship.	Bales.	s.	d.
AN	Grs.lam. ..	5	0	6½
	,, ,, ..	6	0	7
	,, ,, ...	5	0	6
	Flc.wsh.lam. ..	4	0	8
CJM KG	Grs.sup.com. ..	5	notsold	
	,, ,, ,, ..	21	0	5¾
	,, ,, ,, ..	3	0	5
	,, ,, ,, ..	11	0	5½
	,, ,, ,, ..	5	0	4¾
	,, pcs. ..	5	0	4

Tantallon, Raglan, Norman, &c.

Mark.	Description & Ship.	Bales.	s.	d.
CJM/KG	..Grs.sup. ..	4	0	5
Waverley Ms. M	ext.sup sn.-wt..	8	1	2
	,, ,, ,,	8	1	3
	,, ,, ,,	6	1	2½
	sn.-wt. ..	1	0	6¼
M/SM	..Scd. ..	14	notsold	
Paarl <H E>	sn.-wt. sup. ext.	5	1	6
	,, ,, ..	2	1	3½
	,, ..	18	1	4
	,, ..	4	1	3½
	,, ..	1	0	9½

ALGOA BAY.

Kinfauns, Saxon, Moor, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
PO	...ext. sup. sn.-wt.	14	1	2½
[KK]	.. ,, ,, ,,	10	1	2
[DD]	... ,, ,, ,,	7	1	1
Various	... ...	36	notsold	

EAST LONDON.

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Kaffrarian FH	Grs.ext.lightcom	31	0	6¼
	,, ,, ,, ,,	7	0	5¾
	,, ,, ,, ,,	13	0	6
	,, ,, ,, ,,	26	0	5¾
	,, ,, ,, ,,	14	0	5½
	,, ,, ,, ,,	11	0	5¾
	,, ,, ,, ,,	16	0	5¼
	,, ,, ,, ,,	9	0	6
	,, ,, ,, ,,	30	0	5½
	,, ,, ,, ,,	38	0	5
	,, sup. ,, ...	5	0	5¼
	,, ,, ,, ..	1	0	5

Norman, Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
SM in triangle	Grs.sup. ..	15	0	4½
	,, ,, ..	14	0	4¾
	,, ,, ...	14	0	5
	,, ,, ..	10	0	4½
	,, ,, ...	11	0	4¼
RM in triangle...	,, ,, ...	11	0	4¾
IM in triangle ...	,, ,, ..	15	0	5
TM in Triangle...	,, ,, ..	10	0	5¼
B&SB	,, ,, ..	8	0	5
	,, ,, ..	7	0	5
*in triangle FB..	,, com ..	6	0	5
,, NS	,, ,, ..	3	0	4¼
	,, ...	5	0	3¾
,, A	.. ,, com ...	4	0	4½
DW	,, ,, ...	35	0	6¾
	,, ,, ..	1	notsold	
Three legs	...sup.sn.-wt. ...	6	1	2½

Saxon, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
OHS	..Grs.com. ..	6	0	5½
TSH	,, ,, ...	6	0	6
	,, ,, ...	9	0	5¾
EAC	... ,, ,, ...	18	0	6
WJW	,, sup.com. ..	7	0	6½
	,, ,, ,, ...	12	0	5¾
	,, ,, ,, ..	5	0	5¾
J. Stewart	.. ,, ,, ,, ..	9	0	6½
TMW	... ,, com. ...	2	0	5
JEM	.. ,, ,, ..	10	0	6
BB/C	.. ,, ,, ..	47	0	6¼
DOW	... ,, ,, ..	1	0	5
FBT/Hebe	Hebe Flc.wsh.sup...	36	0	6¾

Guelph, Gascon, Briton, &c.

Mark.	Description & Ship.	Bales.	s.	d.
ACMcD	..Grs.sup.com. ..	27	0	6¼
Zulu	sup.sn.-wt. ...	12	notsold	
	,, ,, ..	22	1	0½
	,, ,, ..	2	0	10½
<B>	sn.-wt.sup. ..	6	0	11½
	,, ,, ...	1	notsold	
B/L&P	.. ,, ..	13	notsold	

Dunvegan, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Toise	...sup.sn.-wt. ..	26	0	11½
B*B	,, ,, ..	1	0	10½
	,, ,, ..	3	0	10
EL	,, ,, ..	34	notsold	
crossed swords	,, ,, ..	25	notsold	

CAPE. May 7

Norham, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
L&B S	Grs.	37	0	6¾
	,,	37	0	7
	,, lam.	24	0	6¼
	,, ,,	6	0	6
	,, lks.	5	0	3¼
	,, blk.	1	0	5¼
	wsh.lam.	1	0	7
	Grs.	57	0	7
	,,	31	0	6½
	,, blk.	1	0	3¾
	,, lks.	5	0	3¼
	,, lam.	11	0	6¾
	,, ,,	13	0	6¼
N/AN	,,	9	0	7
AN	,,	12	0	6½
	,,	6	0	6¼
	,, lks.	2	0	3¾
AN/W	,,	17	0	6½
	,, dam.	1	0	5¾
,, D	,,	7or8	0	6¾
	,, dam.	1	0	6¾
,, V	,, ,,	10	0	6
,, B	,, bel.	2	0	5
,, L	,, lks.	1	0	2
	,, lam.	5	0	6
,, GL	,, lks.	3	0	3½
,, S	,,	11	0	6¼
,, K	,,	8	0	6½
,, H	,,	19	0	6½
,, PS	,,	13	0	6¼
,, CN	,,	11	0	7
,, VD	,,	3	0	6½
,, DG	,,	6	0	6½
,, Z	,,	5	0	6¼
,, FD	,,	7	0	7
,, ED	,,	9	0	5¾
	,, dam.	1	0	5½
,, MN	,,	10	0	7¼
,, FW	,,	4	0	6½

Norham, Gaika.

Mark.	Description & Ship.	Bales.	s.	d.
NMK/JG	wsh.	3	0	8
AN/L	,, lam.	1	0	6¼
NMK/H	,,	3	0	8½
,, FL	,, mix.	2	0	5
WW	Grs.com.	94	notsold	
<A>	,, ,,	29	0	4½

Kinfauns, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
JHT/L	Scd.sn.-wt.sup.ext.	9	1	1½
S ,, ,,	,, ,, ,,	1	1	0½
WP&Co.	,, ,, ,, ext.	4	1	4½
Paarl/JHT/L	,, ,,	1	1	2
,, ,, OR&MG/G	,, ,, ext.sup.	2	1	3½

Mexican, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
[EHR]	Scd.sup.sn.-wt.	28	1	3
	,, ,, ,,	28	1	2½
AH	Grs.	2	0	5¾
HR	,,	1	0	3¾
	,, blk.	1	0	5¾
	,, ,, mix.	6	0	3¾
	,, xbd	2	0	3¼

ALGOA BAY.

Norman, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
[EKC]	Scd.sup.sn.-wt.	28	1	3½
	,, ,, ,,	4	1	3
W in triangle	,, ,, ,,	39	1	2½
	,, ,, ,,	13	1	2
	,, ,, ,,	15	1	1½
	,, ,, ,,	2	notsold	
[EJ]	Scd.ext.sup.sn.-wt.	17	1	3½
CR in triangle	,, ,, ,, ,,	11	notsold	
[PV]	,, ,, ,, ,,	16	1	3½
WT in triangle	,, ,, ,, ,,	12	notsold	
[FS]	,, ,, ,, ,,	11	1	2
<W>	,, ,, ,, ,,	7	1	1½
[DK]	,, ,, ,, ,,	16	1	2½
[FB]	,, ,, ,, ,,	20	1	2½
[JP]	,, ,, ,, ,,	9	1	2
[HV]	,, ,, ,, ,,	11	1	1

EAST LONDON. May 8.

Gascon, Norman, Dunottar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
WAR	Grs.sup.com.	8	0	6¾
	,, ,, ,,	13	0	6½
	,, ,,	32	0	6¼
	,, ,,	8	0	6
	,, ,,	4	0	6
KAF	,, ,,	20	0	5¾
	,, ,,	5	0	5¼
BUR	Scd.blk.sup.	2	notsold	
	,, white coarse	2	0	10
	,, grey	3	0	9½
KSK/SW	sup.sn.-wt	16	1	1
(KW) ,,	,, ,,	18	1	1
MAL Cathcart LW	Grs.sup.com.	13	0	6¾
	,, ,, ,,	18	0	6½
	,, ,, ,,	12	notsold	
	,, ,, ,,	17	0	5¾
	,, ,, ,,	12	0	5½
	,, ,, ,,	5	0	5¼
n/m	,, ,,	3	0	4½

CAPE.

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
B	Grs.sup.com. ..	19	0	6¾
	,, ,, ,, ..	70	0	6¼
	,, ,, ,, ...	40	0	6
	,, ,, ,, ..	38	0	6½
	,, ,, ,, ...	38	0	6¼
	,, ,, ,, ..	19	0	6¼
	,, ,, ,, ..	45	0	6
	,, ,, ,, ..	87	0	6¼
	,, ,, ,, ..	41	0	5¾
	,, ,, ..	12	0	5¾
	,, ,, com.dam.	2	0	5¾
	,, C C ..	1	0	3½
Various	,, sup.com. ...	1	0	4¾
	,, ,, ...	1	0	5¼

CAPE. May 9

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
CJW/SS	..Grs.very sup.com.	35	0	7¼
,, S	.. ,, supcom. ..	8	0	5¾
,, N	.. ,, bro. ..	11	0	6

Dunottar, Raglan, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl TW&Co.	sn.-wt.ext.sup.	16	1	6
	,, ,, ,, ...	1	1	4
	,, ...	3	1	3½
,, TW 1	,, ext.sup...	1	notsold	
	,, ..	2	1	1
	Scd.coarse ..	1	0	9½
Waverley Ms TW S	sup.sn.-wt.ext ..	4	1	4½
	,, ,, ,, ..	17	notsold	
	,, ,, ,, ..	4	1	3½
	,, ,, ...	3	1	2
	sn.-wt. ...	1	1	0
,, W	.. ,, ..	1	1	0½
,, ,, TW	.. ,, ..	1	0	11½
C/TW&Co	..Scd.coarse ..	4	0	11
CC ,,	.. ,, grey ..	5	0	8½
Waverley/TW	..sup.sn. wt. ..	2	1	3½
,, ,, S	.. ,, ,, ..	16	notsold	
TW/DH	Grs.sup. ..	7	0	6½
	,, mix. ..	3	notsold	
Waverley/H	..sn.-wt. ..	1	1	1
TLT	Grs.sup.com. ..	83	notsold	

ALGOA BAY.

Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
DWD	Grs.sup.com. ..	104	notsold	
	,, ,, ,, dam	1	0	5
DEC	... ,, ,, ,, ..	6	notsold	

EAST LONDON.

Norman.

Mark.	Description & Ship.	Bales.	s.	d.
EL crossed swords	sup.sn.-wt. ...	27	1	0½
GOT	..Grs sup. ..	16	notsold	
EL 6 birds in reversed triangle	Flc.wsh.sup.	54	0	6¾

Dunvegan, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
KSK	sup.sn.-wt. ..	13	1	2
	,, ,, ..	5	1	1
	,, ,, ..	3	notsold	
KNS	... ,, ,, ..	12	notsold	

Briton, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
TGF/Kinahan	..Grs.sup. ..	23	0	6¾
LGL	,, ,, ..	21	0	5¾
	,, ,, ..	21	0	5¼

Kinfauns, Braemar.

Mark.	Description & Ship.	Bales.	s.	d.
EL crossed swords	sup.sn.wt. ..	55	1	0
O	Grs.sup.com. ..	42	0	6
	,, ,, ,, dam	1	0	6¼
	,, ,, ..	30	0	5¼
	,, ,, ...	8	0	6
	,, ,, ..	33	0	5½
	,, ,, ..	20	0	5
	,, ,, ..	52	0	5¼
	,, ,, ..	34	0	5
	,, dam ..	1	0	5½
T. L. Blaine Wauldby	,, sup.com.ext.	5	0	7½
	,, ,, ,, ,,	12	0	7
	,, ,, ,, ,,	20	0	6¾
	,, ,, ,, ..	12	0	6½
	,, pcs. ..	4	0	3¾
G. Blaine Ross	,, sup.com.ext.	8	0	8
	,, ,, ,, ,,	23	0	7¾
	,, ,, ,, ..	4	0	7¼
	,, skt ..	1	0	4½
	,, ,, ..	4	0	4
M. A. Roach Cobonga Park	,, ext.sup.com.	11	0	7¼
	,, ,, ,, ,,	20	0	6½
	,, ,, ,, ,,	12	0	6¾
	,, ewe ,, ,,	18	0	6½
	,, sup.com. ...	4	0	5¾
	,, ,, ext. ...	4	0	6¼
	,, skt. ..	6	0	3¾

Norham, Dunottar, Tantallon, &c,

Mark.	Description & Ship.	Bales.	s.	d.
IVY	Grs.sup. ..	5	0	6¾
	,, ,, ..	7	0	6½
	,, ,, ...	18	0	6
	,, ,, ..	4	0	6
WAR	,, ,, com. ..	19	0	6
	,, ,, ,, ..	31	0	5¾
[K]	sup.sn.-wt. ..	12	1	3
	, ,, ..	24	1	2
R/LW	..Grs.sup.com. ...	13	0	6½
R	... ,, ,, ..	13	0	6

Norham, Carisbrook, Kinfauns, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
HR/LW	..Grs.sup.com ...	11	notsold	
MAL ,, ,,	... ,, ,, ...	12	0	6
JVR	... ,, ,, ...	27	0	6
WM/LW	.. ,, ,, com. ...	12	notsold	
ORS ,,	... ,, ,, ,, ...	10	notsold	
ORS	,, ,, ...	4	0	6
	,, ,, ...	1	notsold	
B	,, ,, ...	10	0	5½
	Flc.wsh.sup. ..	1	0	7
	sup.sn.-wt. ...	2	1	1
	Scd.sup. ..	1	0	6½

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
Kaffrarian M F G	Grs.sup.com. ...	17	0	7½
	,, ,, ,, ..	13	0	7¼
	,, ,, ,, ..	40	0	6¾
	,, ,, ..	37	notsold	
	,, ,, ...	9	0	6¼

CAPE. May 10

Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
FK	Grs.fine com. ...	19	0	5¾
	,, ,, ,, ...	1	0	5¼
AB &c	... ,, ,, ,, ...	4	0	5¾
WP	... ,, ,, ,, ..	4	0	5¼
GAR,JT	.. ,, ,, ,, ..	10	0	5¼
DN&c	.. ,, ,, ,, ...	7	0	5
GC	... ,, ,, ,, ..	7	0	5¼
HS,PVH &c	... ,, ,, ,, ..	9	0	5
SB &c	... ,, ,, ,, ..	9	0	5
AV &c	.. ,, ,, ,, ..	10	0	5
HFV &c	.. ,, ,, ,, ..	6	0	4¼
OVS	... ,, ,, ,, ..	3	0	4¼

Kanzler.

Mark.	Description & Ship.	Bales.	s.	d.
JSH,WJQ &c	..Grs.sup.com. ...	16	0	6
PDP	.. ,, ,, ,, ..	8	0	5¾
MP &c	.. ,, ,, ,, ..	9	0	5¾
CR	.. ,, ,, ,, ..	16	0	5½
CR &c	... ,, ,, ,, ..	16	0	5½
AG/S,CG &c	... ,, ,, ,, ..	19	0	5¼
JLP &c	.. ,, ,, ,, ...	16	0	5
JV	.. ,, ,, ...	3	0	4¼
WJQ	.. ,, ,, com.lam	5	0	6¼
L &c	.. ,, ,, ,, ..	4	0	5¾
M &c	.. ,, ,, ,, ..	5	0	5¼
Various	... .	4	sundry	

Norham, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
SOP	..Grs.ext.sup.com	19	notsold	
NOP	,, ,, ,, ..	32	notsold	
	,, ,, ,, ...	9	0	5¾
PP	,, ,, ,, com.	2	0	6¾
	,, ,, ,, ,,	1	0	5¼
	,, ,, ,, ,,	27	notsold	

ALGOA BAY.

Norman, Scot, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
27 in triangle HL&Co	ext.sup.sn.-wt.	56	1	1½
JS/BW	... ,, ,, ,,	14	1	3
B(3)W	,, ,, ,,	36	1	2½
	,, ,, ,,	27	1	2
	,, ,, ,,	5	1	0½
	,, ,, ,,	11	1	2½
<B>3	,, ,, ,,	17	1	1
	,, ,, ,,	2	0	10
WS	... ,, ,, ,,	8	1	0
3 in triangle HL&Co	,, ,, ,,	55	1	0½
	,, ,, ,,	32	notsold	
ABJ	..Grs.sup.com. ...	21	0	4½

EAST LONDON.

Briton, Norman, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Scd.sup. ...	35	1	2
	,, ,, ...	32	1	1
	,, ,, ...	3	1	0
Baza	,, ,, ...	29	1	1½
	,, ,, ...	18	1	0½
	,, ,, ..	35	0	11½
L&P	,, ,, ...	1	1	0½
	,, ,, ..	2	0	11

Carisbrook, Garth, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows.	sup. F W ..	33	0	7¼
	,, ,, ,, ..	32	0	7
G. Frost	Grs.sup.com.hgt.	6	0	6¾
	,, ,, ,, ,,	8	0	6¼
	,, ,, ,, ,,	16	0	6
	,, bel. ..	5	0	5¼
PB/WF	,, sup.com.	10	0	6¾
	,, ,, ...	20	0	5¾
,, EH	,, ,, com.hgt.	6	0	6½
	,, ,, ,, ..	1	0	5½
	,, ,, ..	9	0	5¾
,, WW	.. ,, com. ..	2	0	5½
PB/GI	... ,, ,, sup. ..	11	0	6½
,, SB	.. ,, ,, ,, ..	7	0	5¼
JG/CG	.. ,, ,, ,, ..	4	0	4¾

Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
Tweedie Bonchurch	Grs.sup.com.hgt.	5	0	8½
	,, ,, ,, ...	24	0	8
	,, skt. ..	1	0	5½
,, 10 ,,	.. ,, sup.com. ..	8	0	8
JT ,,	Grs.sup.com. ...	18	0	7¾
	,, ,, ,, ..	13	0	7¼
	,, ,, ,, ..	3	0	6½
	,, bel. ..	6	0	6¾
	,, ,, ..	1	0	5¾
	,, lks. ...	8	0	4½
J6T ,,	.. ,, sup.com. ..	3	0	6¼
HB	,, ,, ,, ...	23	0	6¾
	,, ,, ,, ...	9	0	6¼
G. Moorcroft	,, ,, ,, ...	19	0	6¼
	,, ,, ..	10	0	5½
	,, ,, skn. ..	1	0	5¾
	,, ,, lam. ..	8	0	6¾
	,, lks. ..	2	0	4¾
EB	,, sup.com.hgt.	5	0	6½
	,, ,, ,, ...	8	0	6¼
	,, ,, ,, ...	18	0	6

Braemar, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
LG	Grs.sup.com. ..	3	notsold	
	,, ,, light ...	20	0	5¾
	,, ,, ,, ..	7	0	5¼
	,, ,, ,, ..	11	0	5
	,, ,, ,, ..	2	0	3¾
	,, ,, com. ..	7	0	5¼
	,, ,, light ..	8	0	5¼
	,, ,, ,, ...	15	0	5
	,, ,, ,, ..	9	0	4¾

Dunvegan, Briton, Moor.

Mark.	Description & Ship.	Bales.	s.	d.
FH CT	Grs.ext.sup.com	41	0	6¼
	,, ,, ,, ,,	42	0	5¾
	,, ,, ,, ,,dam	1	0	6¼
	,, ,, ,, ...	38	0	5¾
	,, ,, ,, ..	41	0	5½
	,, ,, ,, ...	31	0	5¾
[D]	...sup.sn.-wt. ...	10	1	1
WAW	..Grs.sup.com. ..	15	0	6¾
CB	.. ,, ,, ,, ..	17	0	5¾
GC	,, ,, ,, ..	4	0	5¾
	,, ,, ..	2	0	5½
AC	.. ,, ,, com. ..	12	0	5½
JMD	.. ,, ,, ,, ..	31	0	5¾
OMO	.. ,, ext.sup.com.	41	notsold	
COS	.. ,, ,, ,, ,,	36	notsold	

CAPE. May 13.

Gascon, Saxon, Norham.

Mark.	Description & Ship.	Bales.	s.	d.
DOD	Grs.sup.com. ..	27	0	5¼
	,, ,, ,, ..	16	0	4¾
CEW	.. ,, ,, ..	1	0	4½
24 in triangle LBS	sup.sn.-wt. ...	18	1	1
	,, ,, ..	14	1	0½
	,, ,, ...	15	notsold	
WTC	..Grs.sup. ...	5	0	5½
93 in triangle HL&Co	sup.sn..wt. ...	30	1	0½
	,, ,, ..	9	0	11½
RON	..Grs.sup. ...	8	0	5¼

EAST LONDON.

Braemar, Norman, Scot, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Flc.wsh.sup. ...	45	0	7¼
	Scd.sup.SW. ...	26	1	2
	,, ,, ,, ...	14	1	1½
	,, ,, ,, ..	10	1	1
Baza	,, ,, ...	24	1	1
	,, ,, ...	32	1	0½
	,, ,, ...	7	1	0
Lunda	,, ,, ...	5	1	0½
	,, ,, ..	18	0	11½
L&P	,, ,, ...	1	0	11½
	,, ,, ...	2	0	11
P	,, blk. ...	4	1	0
	,, C C ...	5	0	9
	,, coarse ...	6	0	11

Dunottar, Tantallon.

Mark.	Description & Ship	Bales.	s.	d.
PB/TLT	...Grs.com. ..	6	0	5¾
,, WF	... ,, ,, ..	3	0	5¾
,, MU	... ,, ,, long ...	2	0	5½
,, PB	.. ,, ,, ,, ...	1	0	5¼
,, FD	... ,, ,, ..	1	0	5¾
,, WC	... ,, ,, ..	7	0	5¼
,, GP	.. ,, sup. ...	6	0	6¼
,, GF, &c.	... ,, ,, ..	6	0	5¾
,, RA	Grs.com. ...	42	0	5
	,, ,, dam ..	2	0	4¾
	,, C C ...	1	0	3½
S	... ,, sup. ...	4	0	6

Kinfauns, Briton.

Mark.	Description & Ship	Bales.	s.	d.
Yukon	Scd.sup. ...	24	1	0
	,, ,, ..	23	0	11½
	,, ,, ...	4	0	11½
	,, ,, ..	15	0	11
Bomvana	,, ,, ...	36	0	11½
	,, ,, ...	23	0	11
	,, ,, ..	3	0	11
Bolo	,, ,, ..	15	0	11½
	,, ,, ..	24	1	0½
	,, ,, ..	33	1	0
MB AN	Grs.sup.com. ..	24	0	5½
	,, ,, ..	62	0	5¼
	,, ,, ..	16	0	5
	,, ,, ...	85	0	4¾
	,, ,, ..	97	0	4½
	,, ,, ..	23	0	4¾
	,, ,, ..	5	0	5
	,, ,, ...	79	0	4¼
	,, ,, ..	4	0	5½
	,, ,, ..	25	0	11
M/L&P	Scd.sup. ..	1	1	1
	,, ,, ..	23	0	10
M	,, blk. ..	10 not sold		
	,, C C ..	9	0	8½
	,, coarse ..	24	0	9½
MB/Q	..Grs.com. ...	6	0	5½

CAPE.

Dunvegan, Briton, Norman, &c.

Mark.	Description & Ship	Bales.	s.	d.
Paarl [HT]	...Scd sn.-wt.sup.ext.	18 not sold		
,, HD	.. ,, ,, ,, ,,	22 not sold		
,, S	,, ,, ,, ..	2 not sold		
	,, ,, ,, ...	3	1	0
Waverley Ms RPR	,, ,, ,, ext.	12 not sold		
CJM RK	Grs.sup. ...	5	0	5
	,, ,, ..	6	0	4¾
	,, ,, ...	44 not sold		

CAPE. May 14.

Dunottar, Gascon, Saxon, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl [WLS]	...sn.-wt.ext.sup.	14	1	6½
Melton Wold	Grs.com. ..	12	0	6
	,, ,, ..	40	0	5¾
	,, ,, ..	31	0	5½
	,, , ..	40	0	5¼
	,, sup. ..	19 not sold		
	,, ,, ..	3	0	5
	,, pcs. ..	3	0	2¾
K/AE	.. ,, com. ..	9	0	5¼
S in triangle	.. ,, ,, ..	1	0	4
HH	..Scd.crse.col. ..	40	0	6
S/R Caledon	Grs.ext.sup.com.	7	0	6½
	,, ,, ,, ,,	4	0	6¼
SOP	,, ,, ,, ,,	13 not sold		
	,, ,, ,, ,,	7	0	6
	,, ,, ,, ,,	14	0	5½
OIC	Grs.com. ..	54	0	5¼
	,, ,, ..	28 not sold		
	,, ..	7	0	5¼
	,, com.dam ..	1	0	4¾

EAST LONDON.

Norham, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed swords	sup.sn.-wt. ..	5	1	2
	,, ,, ..	24	1	1½
EL Crossed swords	,, ,, ..	55	1	1½
	,, ,, ..	26	1	1
	,, ,, ..	26	1	0½
	,, ,, ..	27	1	0

Briton, Saxon, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
Toise	sn.-wt.sup. ..	10	1	0
	,, ,, ..	2	0	11½
	,, ,, ..	1 not sold		
Zulu	,, ,, ..	70	1	1
	,, ,, ..	8	1	0½
B	,, ,, ..	3	0	11½
	,, ..	16	1	0
	,, ..	1 not sold		
B*B	,, ..	14	0	11
	,, ..	10	0	11½
B/L&P	... ,, ..	13 not sold		
EXW	... Scd.blk. ..	15 not sold		

Norham, Dunottar, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
DW	Grs.com. ..	1	0	3½
<JGD>	,, sup. ..	48 not sold		
CA	,, ,, ..	8	0	5¼
AJK	,, ext.sup.com.	8	0	6½
AM	,, ,, ,, ,, ..	2	0	4¾
	,, ,, ,, ,, ..	1	0	6¼

Gascon, Scot.

Mark.	Description & Ship.	Bales.	s.	d.
SLC	Grs.sup.com. ..	15	not sold	
	,, ,, ,,	7 or 8	0	5¾
	,, ,, ,, ..	50	not sold	
KSK	sup.sn.-wt. ..	24	1	2
	,, ,, ..	34	1	1½
	,, ,, ..	17	not sold	

Norham, Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
WIN	Grs.sup.com. ..	54	not sold	
	,, ,, ,, ..	3	0	6¼

Kinfauns, Saxon, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
BON	...Grs. ..	103	not sold	
LLH	... ,, sup.com...	57	not sold	
SGT	... ,, ,, ,, ..	40	not sold	
F C in reversed triangle G	,, ,, ,, ..	14	0	6¼
	,, ,, ..	33	0	6¼
	,, ,, ..	14	not sold	
(KN)	sup.sn.-wt. ..	24	1	1½
	,, ,, ..	13	1	1
	,, ,, ..	1	not sold	
LGL	Grs.sup. ..	13	not sold	
	,, ,, ..	18	0	5¼
	,, ,, ..	47	not sold	
HWY	... ,, ..	9	0	5

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
B Vickers	Grs.sup. ..	19	not sold	
	,, ,, ..	20	0	5½
	,, ,, dam. ..	1	0	4½
W Vickers	... ,, ,, ..	11	not sold	

CAPE. May 15.

Mexican, Arab.

Mark.	Description & Ship.	Bales.	s.	d.
[HR]	...Scd.sup. S W..	37	1	0
RR	Grs.sup.com. ..	22	0	6¾
	,, ,, ,, ..	28	0	6½
	,, ,, ,,	18 or 19	0	6¼
	,, ,, ,, ..	33	0	6
	,, ,, ,, ..	29	0	5¾
	,, ,, ,, ..	23	0	5½

Kinfauns, Saxon, Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
L&B S	Grs. ..	26	0	6¾
	,, ..	51	0	7
	,, ..	10	0	6
	,, lks. ..	5	0	3¼
	,, lam. ..	3	0	5½
	Flc.wsh. ..	1	0	9½
	Grs. ..	33	0	7
	,, ..	68	0	6¾
	,, lks. ..	6	0	3¼
	,, lam. ..	12	0	6¼
	Hw. ..	1	0	6
	Grs. ..	29	0	6¾
	,, ..	67	0	6½
	,, blk.mix. ..	2	0	4
	,, lks. ..	7	0	3¾
	,, lam. ...	4	0	6¼
	Flc.wsh. ..	1	0	8
Various	.. .. ..	2	sundry	

Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
NMK	..Flc.wsh. ..	4	0	8½
,, A	.. ,, ,, ..	7	0	8
,, G	,, ,, ..	9	0	8½
	,, ,, ..	8	0	10½
	,, ,, ..	10	0	8
,, D	.. ,, ,, ..	4	0	8½
,, E	.. ,, ,, ..	7	0	8½
,, JG	.. ,, ,, ..	9	0	8½
GWH	Scd.sn.-wt. ...	40	not sold	
	,, ,, ..	25	0	10½
<O>	.. ,, sup.lam ...	11	not sold	
Various	.. .. ..	3	sundry	

ALGOA BAY.

Carisbrook, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
HS	..Scd.ext.sup.S W ..	6	1	3
(WW)	... ,, ,, ,, ,, ,, ...	17	not sold	
(PS)	.. ,, ,, ,, ,, ,, ...	10	1	1½
(DK)	.. ,, ,, ,, ,, ,, ..	16	1	2½
(FB)	.. ,, ,, ,, ,, ,, ...	20	1	2
Various	.. ..	77	not sold	

CAPE. May 16.

Kinfauns, Saxon, Dunvegan, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms. B	sn.-wt.ext.sup.	21	1	5
		26	1	3½
	,, ,, ,,	26	1	3
	,, sup. ..	14	1	2½
	,, ..	2	1	2
	,, ..	1	1	0
	,, sup.ext. ..	1	1	3
	,, ,, ..	7	1	1

Mark.	Description & Ship.	Bales.	s.	d.
Waverley Ms. B	Scd. ..	6	1	0
	sn.-wt.ext.sup.	33	1	5
	" ..	1	1	2
	" sup.ext. ..	7	1	5
	" " ..	2	1	3
	" " ..	2	1	2
	" " ..	10	1	1½
Paarl/WL	sn.-wt.sup.ext.	8	1	5½
	" ..	1	0	9
TP	Grs.ext.sup.com.	35	0	5¼
	" " " ..	5	0	5
	" " " ..	9	0	5¼
	" " " ..	14	0	4¾
	" " " ..	2	0	4
ZZ	Grs.sup.com. ..	20	0	3¾
	" " " ..	36	0	5½
	" " " ..	15	0	5¼
	" " " ..	3	0	4
	" " " ..	4	0	5¾

ALGOA BAY.

Carisbrook, Dunottar, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
JFS	..sup.sn.-wt.ext.	25	1	2
98 in triangle HL&Co.	" " "	23	notsold	
30 in triangle HL&Co.	" " "	58	notsold	

EAST LONDON.

Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
ART	Grs.sup.light ..	89	notsold	
	" " " ..	5	0	5½

CAPE. May 17.

Dunvegan, Mexican, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
WWW Caledon	Flc.lam.sup. ..	4	0	8½
	" " ..	2	notsold	
	" " ..	5	0	7½
	Grs. " " ..	2	0	6½
	" " ..	4	0	6¼
	" " ..	2	0	6½
AAA K	Grs.sup.com. ..	22	0	6¾
	" " " ..	11	0	5¼
	" " " ..	27	0	5½
VV	" " " ..	21	0	5¾
	" " " ..	35	notsold	
	" " " ..	53	0	5

CAPE.

Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
POP	Grs.sup.com. ..	21	0	1¾
	" " " ..	59	notsold	

Herzog.

Mark.	Description & Ship.	Bales.	s.	d.
JVS	..Grs.sup.com. ..	11	0	5¾
FO	.. " " " ..	11	0	5½
JP &c	.. " " " ..	11	0	5½
HM &c	.. " " " ..	11	0	5¼
AN,JT &c	.. " " " ..	7	0	5
AR &c	.. " " " ..	5	0	4¾
B&B,JB &c	.. " " " ..	7	0	5
WJK &c	.. " " " ..	9	0	5¼
AVJ &c	.. " " ..	5	0	4½
WJK	.. " " dam ..	1	0	5

Bundesrath.

Mark.	Description & Ship.	Bales.	s.	d.
JSH &c	..Grs.sup.com. ..	9	0	5¼
PE,MP &c	.. " " " ..	7	0	5½
JP,JJP	.. " " " ..	11	0	5¼
PCH,JGH &c	.. " " " ..	11	0	5¼
ADP,PDP &c	.. " " " ..	12	0	5
LP,NP &c	.. " " " ..	11	0	4¾
AG	.. " " " ..	7	0	5¼
HV &c	.. " " " ..	4	0	5¼
JP	.. " " " ..	5	0	5
TH,FF &c	.. " " " ..	13	0	4½
JS	.. " " " ..	15	0	5½
JJK,JP &c	.. " " ..	6	0	4¼
MF	.. " " ..	3	0	4¼
W&Co,PDP &c	.. " " ..	9	0	1½
CSD	.. " " ..	2	0	4
HP &c	.. " " lam ..	4	0	5
JP &c	.. " " com.dam	2	0	4¾
JS	.. " " " "	1	0	5½
PDP &c	.. " C C ..	2	0	3½

Norman, Norham.

Mark.	Description & Ship.	Bales.	s.	d.
OAP	..sup.sn.-wt.ext.	13	notsold	
OMP	.. " " "	13	notsold	
SOP	Grs.ext.sup.com.	15	0	5¾
	" " " "	11	0	5¼
	" " " ,,lam.	2	notsold	
	" " " ..	4	0	5

ALGOA BAY.

Norman, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
26 in triangle HL&Co	sup.sn.-wt.ext.	11	1	0½
	,, ,,	1 notsold		
[24] &c ,,	,, ,, ,, ..	16	1	2
	,, ,, ..	1	1	0½
[27]	.. ,, ,, ,, ..	7	1	2
9 in triangle &c ,,	,, ,, ,, ..	17 notsold		
12 in triangle ,,	.. ,, ,, ,, ..	35 notsold		
10 in triangle ,,	,, ,, ,, ..	12	1	0½
	,, ,, ..	2	0	9
<M>	Grs. ..	1	0	7¼
	,, ..	1	0	6

EAST LONDON.

Briton, Carisbrook, Dunottar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed arrows	..Scd.sup. ..	30 notsold		
Baza	,, ,, ..	64	1	0½
	,, ,, ..	5	1	0
	,, ,, ..	2	0	10
Lunda	,, ,, ..	27	1	0½
	,, ,, ..	7	0	11½
C&CS < >	.. ,, grey ..	14	0	10
< * >	.. F W sup. ..	18	0	6¾
A. H. Frost Sunnyside	Grs.com.hgt.sup.	8	0	6½
	,, sup.ext. ..	19	0	6¼
	,, ,, ..	13 notsold		
	,, bel. ..	3	0	4¾
PB WL	,, sup.com. ..	10	0	6
	,, ,, ,, ..	14	0	5¾
	,, ,, ,, ..	3	0	5¼
	,, ,, lam. ..	2	0	6
PB/WS	,, ,, long ..	14	0	5¾
	,, ,, ..	13	0	5¼

Gascon, Norman, Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
SXM	Grs.sup.com. ..	48 notsold		
	,, ,, ,, ..	29	0	6
	,, ,, ,, ..	9 notsold		
W. H. James ..	,, ,, ,, ..	78 notsold		
SXM	,, ,, ,, ..	73 notsold		
RCB	,, ,, light ..	8	0	5
	,, ,, ,, dam	1	0	4½

Saxon, Norman, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
KFN	..Grs.sup.light ..	10	0	4½
SBC	,, ,, com. ..	29	0	5¼
	,, ,, ,, ..	5	0	5
(W)	.. ,, Scd.wsh. ..	1	0	5¾
SXM	.. ,, sup.com. ..	26 notsold		
WO	.. ,, ,, ,, ..	64 notsold		
XSQ	Grs ext.sup.com.	19	0	5½
	,, ,, ,, ,,	15 notsold		
NOM	,, sup.com.ext.	9	0	5½
	,, ,, ,, ,,	17	0	5¼
<BS>	.. ,, ,, ,,	17	0	5¼
Various	.. ..	3 sundry		

CAPE. May 18

Norman, Goorkha, Saxon, Gaika, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/D	..Scd.sn.-wt.ext.sup.	8	1	3½
,, V	.. ,, ,, ,, ,,	10	1	2½
,, ◇	,, ,, ,, ,,	8 notsold		
	,, ,, sup. ..	3	1	1½
	,, lks. ..	3	0	11½
	,, C C ..	1	0	8
CJM/Z/BL	Grs.com.sup. ..	10	0	6½
	,, ,, ,, ..	19	0	6¼
,, KG	.. ,, sup. ..	5	0	5¼
,, JL	.. ,, com.sup. ..	23	0	5¼
Waverley Mills	Scd.sn.-wt.ext.sup	12 notsold		

Briton.

Mark.	Description & Ship.	Bales.	s.	d.
CS	Grs.com. ...	45	0	4
	,, ,, ...	20	0	4½
	,, ,, ..	19	0	4
	,, ,, ...	12	0	4¼
	,, ,, dam. ...	6	0	2

Dunvegan, Dunottar, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
◇ CS	Grs.sup. ..	69	0	4½
	,, C C ..	1	0	3¾
	,, dam. ...	2	0	3¼
CC	.. ,, sup. ...	8	0	4½
C/FG	.. ,, ,, ...	6	0	4½
C	... ,, C C ..	4	0	3¼
C&Co	,, com. ..	4	0	4
	,, ..	9	0	4½

EAST LONDON.

Briton, Dunottar, Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	21	1	0½
	,, ,,	13	1	0
	,, ,,	1	0	11½
	,, ,,	21	1	0
MB/D	,, ,,	19	0	11½
Yukon	,, ,,	29	1	0
	,, ,,	9	0	11½
	,, ,,	16	0	11
Bomvana	,, ,,	13	0	11½
	,, ,,	9	0	11
MB	Grs.sup.com.	21	0	5¼
	,, ,, ,,	10	0	4½
,, D	,, ,, ,,	28	0	5
	,, ,,	1	0	4½
,, RT	,, ,, com.	17	0	5
,, SM	,, ,, ,,	27	0	4¾
	,, ,,	11	0	4½
	,, C C	1	0	2¼
,, CH	,, sup.com.	11	0	4¾
,, HW	,, ,, ,,	14	0	5¾
	,, ,, ,,	8	0	4¾
	,, ,,	7	0	5¼
	,, ,,	1	0	4½
,, M	,, ,, com.	14	0	5¼
	,, ,, ,,	20	0	5¾
	,, lks.	1	0	1½
,, OVB	,, sup.	8	0	5
	Flc.wsh.	6	notsold	
,, R	Grs.sup.com.	9	0	4¾
	,, ,,	13	0	4½
,, U	,, ,, com.	42	0	5
	,, ,, ,,	42	0	4¾
	,, ,,	20	0	4½
	,, ,, dam.	1	0	4½
,, Z	,, ,, com.	9	0	5¼
	,, ,, ,,	11	0	4¾
	,, ,,	18	0	4¾
,, AN	,, ,, com.	16	0	5¼
	,, ,,	37	notsold	
	,, ,,	38	0	4½
	,, ,,	64	0	4¼

Norman, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	9	1	0½
	,, ,,	2	0	10½
	,, ,,	1	0	10
	,, ,,	11	1	0
	,, ,,	6	0	11½
Yukon	,, ,,	5	1	0½
	,, ,,	10	0	11½
	,, ,,	2	0	11
	,, ,,	8	0	11½
	,, ,,	6	0	11
Bomvana	,, ,,	2	0	11

Braemar, Dunvegan, Carisbrook, Briton, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Flc.wsh.sup.	51	0	7¼
	Scd.sup. S W	44	1	2
	,, ,, ,, ,,	21	1	1½
Baza	,, ,,	26	1	0½
	,, ,,	68	1	0
Lunda	,, ,,	2	1	0½
	,, ,,	3	0	11

CAPE. May 20.

Dunottar, Briton, Gascon.

Mark.	Description & Ship.	Bales.	s.	d.
HH	Scd.crse.col.	40	0	6
Melton Wold	Grs.sup.	19	0	5¾

ALGOA BAY

Saxon, Kinfauns, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
<H>	sup.sn.-wt.ext.	20	1	0
FK	,, ,, ,,	10	1	0½
TF	Grs.ext.sup.com.	37	0	5
	,, ,, ,, ,,	35	0	4¾
	,, ,, ,, dam.	1	0	4¾
	,, skt.	5	0	3½

EAST LONDON.

Dunottar, Tantallon, Kinfauns.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed swords	sn.-wt.sup.	138	1	0½
	,, ,,	59	1	1
	,, ,,	59	0	11½

Scot.

Mark.	Description & Ship.	Bales.	s.	d.
B	sn.wt.sup.	42	1	1
	,, ,,	24	1	0½
	,, ,,	8	1	1
	,, ,,	14	1	0

7, Butler Street, Cripplegate,
London, E.C., May 20th, 1901.

The third series of Colonial Wool Sales for the current year commenced on the 30th ult. and closed this day. The Brokers' priced catalogues were enfaced as follows :—

	BALES.
Sydney	65,392
Queensland	22,284
Victoria	28,170
Adelaide	10,462
Tasmania	341
West Australia	6,573
New Zealand	75,963
Cape and Natal	19,402
Total	228,587 Bales.

Purchases for export are estimated at about 107,000 bales, whilst "held-over" and "bought-in" parcels are computed at somewhere about 47,000 bales, for realization in the ensuing series to commence here on the 2nd July, 1901.

STABLES, STRAKER & CO.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 15th June, 1901, as telegraphed by the Civil Commissioners of the places respectively named, and Natal, is published hereunder.

CENTRE.	A. Wheat. per 100 lb.	B. Wheat. Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M Mutton. per lb.	N. Fresh Butter, per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 10 6	0 18 0	0 13 6	0 9 0	0 10 0	0 8 6	0 15 0	0 12 0	0 10 0	0 1 0	0 0 9	0 0 9	0 2 0	0 4 0	£15 to £18	18/- to 20/-
Beaufort West ..	0 13 0	1 0 0	0 12 6	0 13 6	...	0 15 0	0 15 0	0 9 6	1 0 0	0 1 0	0 0 8	0 0 6	0 2 0	0 3 0	£12 to £15	20/- to 22/6
Burghersdorp ..	0 10 0	...	...	0 8 0	...	0 10 6	...	...	0 10 0	0 1 9	0 0 9	0 0 7	0 1 6	0 3 3	...	...
Cape Town ..	0 10 6	0 12 6	0 10 9	0 8 0	...	0 10	0 11 0	0 12 0	1 7 0	0 0 5¼	0 0 7	0 0 7½	1 9	0 3 3	17 0 0	1 0
Clanwilliam ..	0 13 6	0 19 0	0 15 0	0 9 3	...	0 10 0	0 14 0	...	1 0 0	0 1 3	0 0 7	0 0 6	0 1 6	0 1 6	12 0 0	1 0 0
Colesberg ..	0 12 6	0 15 0	...	0 10 0	...	0 12 0	...	0 12 6	0 17 0	...	0 0 10	0 0 9	0 2 6	0 3 0	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...		...	...	...
Dordrecht ..	0 10 6	1 0 0	0 18 0	0 10 6	0 14 6	...	...	...	0 10 6	0 2 6	0 0 10	0 0 9	2	0 3 0	...	...
East London ..	0 12 6	0 18 0	0 17 6	0 11 6	0 9 6	0 15 6	0 18 9	0 14 6	1 2 6	0 1 6	0 1 0	0 1 0		0 2 9	£18 to £25	18/- to 23.6
Graaff-Reinet ..	0 12 6	0 18 0	0 13 9	0 11 6	...	0 12 0	0 15 0	...	0 8 6	0 1 6	0 0 7	0 0 7	0 2 0	0 2 6	£10 to £13	20/- to 22/6
Graham's Town ..	...	...	0 13 0	0 10 0	...	0 8 6	...	0 10 0	0 12 6	0 1 4	0 0 8½	0 0 10	0 3	0 3 0	...	...
Kimberley ..	0 14 0	0 18 0	0 15 0	0 13 0	0 12 6	0 13 0	0 15 0	0 15 0	1 0 0	0 1 0	0 1 0	0 0 10	0 2 0	0 3 0	£15 to £18	18/- to 22/-
King Wm's Town	0 13 0	0 17 0	0 14 0	0 8 6	0 11 0	0 11 6	0 15 0	0 13 6	1 4 0	0 0 9	0 0 9	0 0 10	0 2 7	0 2 3	£16 to £23	18/- to 25/6
Malmesbury ..	0 11 0	0 15 0	0 12 0	0 10 0	...	0 10 0	0 10 0	0 10 0	1 0 0	0 1 6	0 0 8	0 0 7	0 1 6	0 2 0	17 0 0	1 4 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag	K. Tobacco (Boer Roll). per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 11 6	0 16 0	0 11 6	0 7 6	..	0 6 0	0 10 0	0 10 0	0 15 0	0 1 0½	0 0 9	0 0 9	0 1 6	0 1 6	12 0 0	1 2 0
Pietermaritzburg, Natal	...	...	...	0 6 0	0 6 9	...	..	0 13 0	0 18 0	0 1 0	0 0 10	0 0 10	0 2 3	0 3 0	25 0 0	1 5 0
Port Alfred	...	...	...	0 11 6	...	...	...	0 9 0	0 11 0	...	...	..	0 1 9	0 1 11	...	...
Port Elizabeth ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	..
Queen's Town ...	0 12 0	0 17 6	0 13 0	0 8 6	0 10 0	0 15 6	0 15 3	0 12 6	0 14 0	0 2 6	0 0 8	0 0 7	0 2 6	0 0	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Worcester ..	0 11 0	0 15 0	0 12 0	0 9 0	0 10 6	0 7 6	0 7 6	0 11 6	0 18 6	0 0 9	0 0 8	0 0 7½	0 2 0	0 2 6	15 0 0	1 2 0

NOTE.—Returns have not been received from the Civil Commissioners of Cradock, Port Elizabeth, Tarka and Vryburg.

Date of issue.	Date of issue.	Date of issue.